University of Alberta
Printing Department

CALENDAR

of the

University of Alberta

Fifty-third Session

1960-61

The University of Alberta is a co-educational, publicly-supported institution, possessing the sole right of conferring degrees, other than degrees in Divinity, within the Province of Alberta. It is a member of the Association of Universities of the British Commonwealth, of the National Conference of Canadian Universities and Colleges and of the International Association of Universities.

Instruction at the University began in September 1908, in what is now the Faculty of Arts and Science but was first officially so named in 1914. Teaching in other fields was established as follows: 1912—Law; 1913—Medicine and Engineering; 1915—Agriculture; 1917—Dentistry and Pharmacy; 1918—Household Economics; 1924—Nursing; 1928—Commerce; 1950—Physical Education; 1954—Physiotherapy. Graduate Study began slowly in the early years but has increased rapidly since 1950; the Faculty of Graduate Studies was established in 1957.

The Department of Extension was initiated in 1912, and the Banff School of Fine Arts in 1933. University classes began in Calgary in 1946; the first year of Arts and Science was provided in 1951, and the first year of various degree courses and the second of some have gradually been added.

As this calendar is published a considerable time before the opening of the Session, the University reserves the right to make whatever changes circumstances may require, including cancellation of particular courses.

Printed by the University of Alberta

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I—INTRODUCTION

1960 CALENDAR 1960

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ACADEMIC SCHEDULE

1960-61

1960

July—

Friday, 1—

Fifty-fourth University year begins.

Monday, 4—

Summer Session supplemental examinations.

8:30 a.m.—Registration of Summer Session students.

1:00 p.m.—Summer Session lectures begin.

Banff School of Fine Arts Summer Session begins.

Monday, 11—

Last day for receiving applications to write conjoint Nurse graduation and registration examinations conducted in August.

Friday, 15—

Last day for application for Graduate degrees to be conferred at Fall Convocation.

August—

Monday, 1—

Last day for receiving applications for September examinations on behalf of affiliated professional societies (for Nursing see July 11).

Last day for receiving formal applications for admission of students from outside Canada.

Last day for students with unsatisfactory university records to notify the Student Counselling Services that they are seeking re-admission.

Applications due for August matriculation examinations at the Examinations Branch, Department of Education, Administration Building.

Friday, 5—

Last day for receiving applications for supplemental examinations.

Saturday, 13—

Summer Session ends.

Banff School of Fine Arts Summer Session ends.

Monday, 15—

August matriculation examinations begin.

Last day for receiving applications for admission to the Faculty of Law and the Faculty of Pharmacy.

Conjoint Nurse graduation and registration examinations begin.

Monday, 22—

Supplemental examinations begin in Medicine and Dentistry.

Tuesday, 30—

Primary Examinations of Institute of Chartered Accountants of Alberta begin.

Wednesday, 31—

Last day for receiving applications from residents of Canada for admission to the faculties of Agriculture, Arts and Science (including pre-dentistry, pre-law and Arts and Science for Medicine), Education,

Engineering, Graduate Studies and to the Schools of Commerce, Household Economics, Nursing, Physical Education and Physical and Occupational Therapy. No assurance can be given that late applications will be dealt with in time for registration.

September—

Monday, 5—

Labor Day; University buildings closed.

Tuesday, 6—

Supplemental examinations begin.

Registration of Medical students; First Year, 8:45 a.m.; second 9:30 a.m.; third 10:15 a.m.; fourth 11:00 a.m.

Registration of Dental students: First year, 1:30 p.m., second 2:15 p.m.; third 3:00 p.m.; fourth 3:45 p.m.

Intermediate and Final Uniform Examinations of the Institute of Chartered Accountants of Alberta begin.

Professional examinations begin except in Nursing (See August 15).

Wednesday, 7—

8:30 a.m.—Lectures begin in second, third and fourth years in faculties of Dentistry and Medicine.

Wednesday, 7 and Thursday, 8—

Orientation exercises for first year Medical and Dental students.

Friday, 9—

Lectures begin in first year in faculties of Dentistry and Medicine.

Saturday, 10—

Last day for receiving registrations in the Evening Credit Program (including students in the Faculty of Graduate Studies).

Thursday, 15—

Last day for submission of theses by graduate students expecting to receive their degrees at Fall Convocation.

Last day for filing by M.D. and D.D.S. students of applications for grants and loans under Students' Assistance Act.

Saturday, 17—

9:00 a.m.—Registration of students in the Faculty of Law.

Monday, 19—

8:30 a.m.—Lectures begin in the Faculty of Law.

Registration Period for Full-time Students, September 19 to 22.

Monday, 19—

First day for registration of students in the Faculty of Graduate Studies. Registration of new full-time students in the complete first year of Agriculture, Commerce, Arts and Science, Education (Junior E), Engineering, Household Economics, Medical Laboratory Science, Nursing (B.Sc.), Pharmacy, Physical Education and Physical or Occupational Therapy. Registration also of students entering the courses leading to the Diploma in Public Health Nursing, the Diploma in Teaching and Supervision in Schools of Nursing, and the final year of the degree program in Nursing.

Tuesday, 20—

Registration of new full-time students in the complete first year of Education (B.Ed.). Registration of students entering the second, third or fourth years of the degree course in Nursing, and the first, second or third year of the diploma course in Nursing.

Registration of full-time students attending for their second session in Arts and Science (except combined B.A., LL.B. course and students in any pattern who are repeating all of first year).

Wednesday, 21—

Registration of full-time students attending for their second session in Agriculture, Arts and Law (B.A., LL.B.—combined course), Commerce, Education, Engineering, Household Economics, Medical Laboratory Science, Pharmacy, Physical Education and Physiotherapy, also students in Arts and Science who are repeating *all* of the first year. Registration of full-time students in the third year of Medical Laboratory Science, and students in the B.Ed. program following a B.A. or other approved degree.

Thursday, 22—

Registration of full-time students in the third or fourth year of programs in Agriculture, Arts and Science, Commerce, Education (except B.Ed. after other approved degree), Household Economics, Pharmacy, Physical Education, and Engineering.

Friday, 23—

8:30 a.m.—Lectures begin for all students registered in previous four days.

Monday, 26—

First day for registration of B.D. candidates and of Special and Part-time students in all faculties.

Evening Credit Program classes begin.

October—

Saturday, 1—

Last day for oral examination of Masters and Doctoral candidates for Fall Convocation.

Last day for registration of part-time and special students and of students in the Faculty of Graduate Studies (extramural and intramural) except those in Evening Credit Program (see September 10).

Last day for filing by other than M.D. and D.D.S. students of applications under the Students' Assistance Act.

Special supplemental examinations.

Monday, 10—

Thanksgiving Day; University Buildings closed.

Saturday, 15—

Last day for payment of undergraduate fees.

Last day for registration of B.D. students.

Saturday, 22—

Notice of intention to be absent from Fall Convocation must be given by 12:00 noon.

Saturday, 29—

(afternoon)—Fall Convocation (to be held in Calgary).

November—

Monday, 14 to Saturday, 19—
Test Week*.

December—

Thursday, 1—
Last day for receiving applications to write January conjoint nurse graduation and registration examinations.
Thursday, 15—
Last day for receipt of applications for Certificates of Post-Graduate Qualification in Medicine.
Thursday, 22—
Last day of lectures before Christmas vacation.
Friday, 23—
Christmas vacation begins.

1961

January—

Monday, 2—
Christmas vacation ends.
Tuesday, 3—
8:30 a.m.—First term lectures resume.
Last day for filing second term applications for grants and loans under the Students' Assistance Act.
Saturday, 7—
Last day of lectures in the first term except in the D.D.S., the LL.B. and M.D. programs.
Monday, 9 to Saturday, 14—
Mid-session examinations, except in the D.D.S., the LL.B. and the M.D. programs*.
Thursday, 12—
Conjoint Nurse graduation and registration examinations begin.
Monday, 16—
Second term lectures begin.
Last day for payment of second instalment of fees.

February—

Wednesday, 1—
Last day for application for Graduate Degrees to be conferred at Spring Convocation.
Monday, 13 to Saturday, 18—
Test Week*.

March—

Wednesday, 1—
Last day for receiving applications for examinations on behalf of affiliated professional societies (except Nursing).
Saturday, 4—
Last day for receiving applications for supplemental examinations to be written in April.

Friday, 31—
Good Friday; University Buildings closed.

April—

Saturday, 1—
Last day for submission by graduate students of theses.
Last day for receipt of applications for admission from new students, undergraduate or graduate, who wish to enter the University in the 1961 Summer Session.

Monday, 3—
Last day for receiving applications for first year Medicine.

Saturday, 8—
Last day of lectures in first year Engineering and fourth year Dentistry.

Tuesday, 11—
Final examinations begin in first year Engineering and fourth year Dentistry.

Friday, 14—
Last day for oral examinations of Master and Doctoral candidates for Spring Convocation.

Saturday, 15—
Last day of lectures for students in Arts and Science, Commerce, Household Economics, Agriculture, Education, Law, Medical Laboratory Science, Nursing, Pharmacy, Physical Education, Physical and Occupational Therapy, and second, third, fourth years of Engineering.

Monday, 17—
Final examinations begin for students in the School of Nursing except first year B.Sc.
Survey School begins for first year Engineers.
Examinations of the following affiliated professional societies begin:
The College of Physicians and Surgeons of Alberta, the Alberta Dental Association, the Alberta Association of Architects, the Association of Professional Engineers of Alberta, the Alberta Land Surveyors' Association, the Alberta Pharmaceutical Association, and the Veterinary Medical Association of Alberta.

Wednesday, 19—
Final examinations begin for other students mentioned under April 15.

Monday, 24—
Field experience begins for students in the School of Nursing except first year B.Sc.
Five weeks clinical period in fourth year Dentistry begins.

Saturday, 29—
Last day for registration of students in the Summer Session.
Second term ends, except in faculties of Medicine and Dentistry, and in first year Engineering.

May—

Monday, 1—
First and second year Medical Laboratory Science students begin eighteen week period of hospital training.
Outdoor School begins for second year B.P.E. students.

Wednesday, 3—
Notice of intention to be absent from Convocation must be given by 12:00 noon.
Saturday, 6—
Last day of lectures in first three years of Dentistry and in all years of Medicine.
Monday, 8—
Three months' period of Hospital Practice for School of Physical and Occupational Therapy begins.
Final examinations begin in first, second and third years of Dentistry and all years of Medicine.
Tuesday, 9—
Charter Day.
Wednesday, 10—
Survey School ends.
Sunday, 14—
Outdoor School ends for second year B.P.E. students.
Monday, 15—
Last day for receiving applications for admission to Dentistry.
Thursday, 25—
Convocation for the conferring of degrees and awarding of prizes, except in Dentistry and Medicine.
Saturday, 27—
Five weeks of clinical work in fourth year Dentistry ends.

June—

Thursday, 1—
Last day for receiving applications for supplementals from 1960 Summer Session.
Monday, 5—
Medical and Dental Convocation.
Friday, 30—
Fifty-fourth University year ends.

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*Students will not be granted permission to leave the campus for extra-curricular activities during test weeks in November, December and February.

Mail should be addressed to the appropriate officer at The University of Alberta, Edmonton, Alberta.

W. H. Johns, *President*

D. E. Smith, *Dean of the Faculty of Arts and Science*

C. F. Bentley, *Dean of the Faculty of Agriculture*

Hu Harries, *Dean of the Faculty of Commerce*

H. R. MacLean, *Dean of the Faculty of Dentistry*

H. T. Coutts, *Dean of the Faculty of Education*

G. W. Govier, *Dean of the Faculty of Engineering*

Elizabeth L. Empey, *Director of the School of Household Economics*

W. F. Bowker, *Dean of the Faculty of Law*

W. C. MacKenzie, *Dean of the Faculty of Medicine*

Ruth E. McClure, *Director of the School of Nursing*

M. J. Huston, *Dean of the Faculty of Pharmacy*

M. L. Van Vliet, *Director of the School of Physical Education*

J. R. Fowler, *Director of the School of Physical and Occupational Therapy*

A. G. McCalla, *Dean of the Faculty of Graduate Studies*

A. D. Cairns, *Registrar*	—Admissions, Convocation, Examinations, Records, Registration, Transcripts.
A. J. Cook, *Director of Student Counselling Services*	—Change of Faculty, Interest and Aptitude Tests, Personal Problems, Off-campus Housing, Unsatisfactory Standing, Vocational Planning, Withdrawals from University.
J. M. Whidden, *Bursar*	—Medical Services, Payment of Fees, Residence Accommodation.
R. B. Wishart, *Administrator of Student Awards*	—Bursaries, Grants, Loans, Scholarships.

OFFICE HOURS:

Monday through Friday	—8:30 a.m. to 12:00 noon. 1:15 p.m. to 4:30 p.m., all year.
Saturday	8:30 a.m. to 12:00 noon, mid-September to mid-May.

Students planning to attend the University of Alberta in Calgary should address communications to The General Office, University of Alberta, Calgary.

THE UNIVERSITY: ITS LAND AND BUILDINGS

In Edmonton, the University possesses 857 acres (campus, 133 acres; farm, 724 acres). The campus, located about two miles from the business centre, borders the wooded southern bank of the North Saskatchewan river. It contains some twelve major teaching and research buildings, in addition to student residences, service buildings and two affiliated colleges. Adjoining are the Alberta Research Council, the Provincial Laboratory of Public Health, two teaching hospitals and the Northern Alberta Jubilee Auditorium.

At Calgary, the new campus extends to about 230 acres, and is situated on the Banff Highway, at the western limits of the city. The two buildings in Calgary are designed to house Arts, Education, Science and Engineering.

The Banff School of Fine Arts, which is administered by the University, is located in the mountains. A few courses for university credit may be taken there in the summer months.

II—PROGRAMS OF STUDY

Faculty or School	Degree or Diploma	Years required (after senior matriculation unless otherwise shown) to complete course	Years of course offered	
			Edmonton	Calgary
Arts and Science	B.A.	3	all	1, 2
	B.Sc.	3	"	1, 2
	B.Mus.	3	"	0
	B.A. Honors	4	"	1
	B.Sc. Honors	4	"	1
	Dip. in Art:	4	"	0
	(Intermed. Dip. in Art)	2	"	0
Commerce	B.Com.	4	"	1
	B.Com. Honors	4	"	1
(with Arts and Sci.)	B.A., B.Com.	5	"	1, 2
Household Economics	B.Sc.	3	"	1
Agriculture	B.Sc.	4 (see matriculation requirements)	"	1
Engineering (Civil, Chemical, Electrical, Mechanical, Metallurgical, Mining, Petroleum, Eng. Physics)	B.Sc.	4	"	1, 2
(with Arts and Sci.)	B.A., B.Sc.	6	"	1, 2
Dentistry	D.D.S.	4 (after pre-Dental year)	"	pre-dent. only
Education	B.Ed.	4	"	1, 2, 3
	B.Ed. in Industrial Arts	4	4th year only	1, 2, 3
Law	LL.B.	3 (after B.A.)	all	0
(with Arts and Sci.)	B.A., LL.B.	5	"	1, 2
Medicine	M.D.	4(after 2 pre-Med. yrs.)	"	0
	B.Sc.	1 (see Med. calendar)	"	0

Faculty or School	Degree or Diploma	Years required (after senior matriculation unless otherwise shown) to complete course	Years of course offered	
			Edmonotn	Calgary
	B.Sc. in Med. Laboratory Sci.	3	all	0
Nursing	B.Sc.	5	"	1
	Dip. Public Health	1 (after hospital graduation)	"	0
	Dip. Teaching-Supervision	1 (after hospital graduation)	"	0
Physical Therapy and Occupational Therapy	Diploma	3	"	0
	Diploma	3	"	0
Pharmacy	B.Sc.	3	"	0
Physical Education	B.P.E.	3	"	0
Graduate Studies	M.A., M.Ed., M.Sc., Ph.D., Ed.D.	see Graduate Studies Calendar	"	depends on field of study
Committee on the degree of Bachelor of Divinity	B.D.	see Arts and Science Calendar	"	0

EVENING CREDIT PROGRAM

Through its Evening Credit Program, the University offers credit courses at various centres in the evening and on Saturdays for the convenience of persons employed during the day. In 1959-60, courses were offered in Calgary, Camrose, Edmonton, Holden, Lethbridge, Red Deer, Trochu, Vegreville, Westlock, Wetaskiwin. For details of the courses, fees, and regulations, see the Evening Credit Program Announcement.

SUMMER SESSION

The University has conducted a Summer Session since 1919. Established primarily to meet the needs of teachers, the Summer Session provides a variety of courses for the convenience of candidates for various degrees who are unable to attend the regular sessions. Courses are offered also for students interested in special fields and for students entering upon degree work who are deficient in certain matriculation subjects. For details of courses, fees, and regulations, see the Summer Session Announcement.

III—(a) ADMISSION REQUIREMENTS

FACULTY OR SCHOOL	PROGRAM	SUBJECTS OF ALBERTA GRADE XII (Senior Matriculation) REQUIRED FOR ADMISSION (with average of at least 60%)								REMARKS
		English 30	Social Studies 30	Maths. 30	Maths. 31*	Chem. 30	Phys. 30	Biol. 32	French 30 German 30 Latin 30	
Arts and Science	B.A. B.A., LL.B. B.Mus. Dipl. in Art	C C C C	C C C C	C C C C		O O O O	O O O O	O O O O	C O C O C O C O	4 compulsory: 2 options. Either two sciences or two languages are required. For B.Mus. matriculants must also have completed Western Board of Music Grade VIII practical and Grades IV and V theoretical examinations.
	B.Sc. (Biological) B.Sc. (Physical) Pre-Dentistry	C C C	C C C	C C C	 C 	O O C	O O C	O O 	C C C	4 compulsory: 2 options. 5 compulsory: 2 options (Chemistry and Physics strongly recommended). 6 compulsory.
Agriculture	B.Sc.	C	C	C		C	O	O	O	4 compulsory, 2 options (Physics recommended). Admission will also be granted on basis of Diploma from Provincial School of Agriculture provided applicant possesses certain Grade XI and XII credits.
Commerce	B.Com.	C	C	C		O	O	O	O	3 compulsory: 3 options.
Dentistry	D.D.S.	C	C	C		C	C		C	The foregoing plus completion of the Pre-dental yr, req'd for adm.
Education	B.Ed.	C	C	O		O	O	O	O O O	2 compulsory: 4 options. Candidates intending to specialize in Household Economics should have Chemistry 30.

Engineering	B.Sc.	C	C	C	C	C	C		C	7 compulsory. Students presenting Chem. 30 without approved lab will have to satisfy Dept. of Chem. as to their proficiency in lab.
Household Economics	B.Sc.	C	C	C		C	O	O	C	5 compulsory: 1 option (Physics is recommended).
Law	LL.B.									Either a B.A. (or equivalent degree) or completion of the first two years of the B.A., LL.B. program is required for admission to Law.
Medicine	M.D.									Satisfactory completion of at least 2 years of university work after senior matriculation including full courses in inorganic chem., organic chem., physics and zoology is required for admission.
	B.Sc. in Medical Lab. Science	C	C	C		C	O	O	O	4 compulsory: 2 options.
Nursing	B.Sc. or Dipl. in Public Health or Teaching and Supervision	C	C	O		C	O	O	O	3 compulsory: 3 options.
Pharmacy	B.Sc.	C	C	C		C	O	O	O	4 compulsory: 2 options (Physics is recommended).
Physical Education	B.P.E.	C	C	O		C	O	O	O O O	3 compulsory: 3 options (Biology is recommended).
Physical Therapy and Occupational Therapy	Diploma Diploma	C	C	C		C	C		C	6 compulsory.

NOTES: (1) In above columns "C" denotes a compulsory subject, "O" an option. The minimum acceptable mark is 50%, the average 60%.
(2) Matriculants from other provinces or countries holding equivalent standing will be deemed admissible.
(3) Social Studies (or History) will not be required of matriculants from outside Alberta or Saskatchewan except in the B.Ed. program.
(4) Further details may be found in the faculty sections of the calendar.

*Mathematics 31 mark not counted in computing required average.

III—(b) ADMISSION PROCEDURES

The courses of study in the University are, unless otherwise specified, open to men and women on equal terms.

Enrolment in any faculty or school must necessarily be limited to the number of students who can be accommodated. Students are normally accepted in the order of their academic standing from among the whole list of applicants.

APPLICATIONS AND TRANSCRIPTS

Prospective students who have not previously attended the University of Alberta must complete Application for Admission forms and must submit them to the appropriate office by the prescribed deadline. Graduate students should obtain forms from the Dean of Graduate Studies, Education students from the Dean of Education and all others from the Registrar of the University. The completed forms should be returned to these same University offices. The applicant should also arrange for the officer to receive two *official transcripts* of his previous education (high school and beyond), *to be sent direct from the the department or institution maintaining such records.*

VISE FEE

A fee of $5.00 is charged for the evaluation of educational documents issued Canada but outside Alberta; the fee is $10.00 for documents issued in other countries. Students entering the Faculty of Graduate Studies are exempt from visé fees.

DEADLINES

Applications for admission to Medicine ..... first Monday in April
Applications for admission to Dentistry ..... middle of May
Applications for admission to Law or Pharmacy ..... middle of August
Applications for admission to all other faculties ..... end of August

NOTE: Earlier deadlines apply in the case of a student who has taken his previous education outside Canada. Such students should submit their applications, suitably documented, one full month before the deadlines outlined above.

For exact dates, please see Academic Schedule at the front of this calendar.

ADVANCED STANDING

Students from other universities may be admitted to advanced standing except in the combined courses. Extramural credits from recognized universities may be accepted under certain conditions, but such credits will not be considered beyond the first year of university work. Students who have taken the equivalent of university courses in some other manner may be excused such courses but will not be granted advanced standing in them. They will be required to substitute other courses in order to complete a program of normal weight at this university.

All applications for such admissions should be addressed to the Registrar well in advance of the beginning of the session. Each application will be dealt with on its merits. The university reserves the right to require applicants for

advanced standing to write examinations at any level including that of matriculation.

The amount of advanced standing that may be granted is limited by the residence requirements of the University of Alberta.

CLASSIFICATION OF STUDENTS

Students are classified as graduates, provisional graduates, special graduates, undergraduates (full-time or part-time), specials, and auditors.

Graduate Students are those holding a recognized degree who have been formally admitted to the Faculty of Graduate Studies as candidates for a higher degree.

Provisional Graduate Students are those holding a recognized degree who are registered in the Faculty of Graduate Studies for the purpose of qualifying for admission to candidacy for a higher degree (see calendar of Faculty of Graduate Studies).

Special Graduate Students are those already holding graduate degrees who are registered in the Faculty of Graduate Studies for some special project or research, and who are neither candidates nor prospective candidates for any further graduate degree.

Undergraduate Students are those who possess full senior matriculation and who are taking one or more courses for credit towards an undergraduate degree. These students fall into two categories:

(a) *Full-time students*—i.e. those who are registered in two-thirds or more of a full year's work.

(b) *Part-time students*—i.e. those who are registered in less than two-thirds of a full year's work.

Special Students are those who, although registered in one or more courses, are currently neither seeking credit towards a degree or diploma, nor entrance into a graduate program.

Auditors are students who are registered in one or more courses and who, having presented to the Registrar written permission from an instructor to attend lectures in his course, are allowed to register in the course as auditors, on the understanding that this privilege permits them only to listen and not to participate in class discussions, assignments, or examinations.

THE FACULTY OF GRADUATE STUDIES

The Faculty of Graduate Studies administers programs leading to the degrees of Master of Arts, Master of Education, Master of Science, Doctor of Philosophy, and Doctor of Education, and makes recommendations for granting the degrees of Doctor of Science and Doctor of Letters. Graduates who take courses in the University but are not at the time candidates for a degree are also enrolled in the faculty as "provisional graduate students".

Full details of regulations and programs of study will be found in the section of the calendar relating to the Faculty of Graduate Studies.

IV—REGISTRATION AND FEES

REGISTRATION PROCEDURE

Students should consult the Academic Schedule at the front of this calendar for registration dates. Further necessary details will be supplied at the time of registration.

Students are required to register for courses in which they are deficient before registering for other courses. The faculty councils reserve the right to adjust courses to meet the requirements of time-tables of lectures and examinations. The program of work for which a student seeks registration is in every case subject to the approval of the Registrar and the faculty concerned.

Graduate students carrying on full-time research or other academic work during the summer months may receive residence credit by registering with the Faculty of Graduate Studies for the whole, or a portion, of the period extending from the end of one regular winter session to the beginning of the next: this period is known as the Intersession. Application for such registration should be made as soon as the applicant's plans for this period are final.

N.B.—A student is responsible for the completeness and accuracy of his registration. He is also responsible for any adjustment of registration made necessary by the results of supplemental examinations. Particular care should be exercised with regard to prerequisite courses. Registration in courses which directly conflict on the timetable will be allowed only when the permission of the Faculty Council concerned has been secured.

PHYSICAL EXAMINATION

All students entering the University of Alberta for the first time are required to take a physical examination at the time of registration.

LATE REGISTRATION

Students are normally required to complete their registration, in person, by the date specified in the academic schedule (page 7). After the end of the registration period, registration will be permitted only in exceptional circumstances and with the payment of a penalty fee of $3.00 plus $1.00 per day. Where possible, application for late registration should be made to the Registrar in advance of the normal registration period.

CHANGES IN REGISTRATION

A student may not abandon a course or change from one course to another without first obtaining permission from his Dean or Director. This permission in the form of a "Change of Registration" slip, signed by the Dean or Director must be presented to the Registrar before the change becomes official.

CANCELLATION OF REGISTRATION

A student who wishes to withdraw from the University should report at once to the Student Counselling Services in order to complete Notice of Withdrawal forms. A student who withdraws without completing such forms will not be eligible for any refund of fees, nor for exemption from fees in the event that he has not paid them.

FEES

(Make all cheques payable **at par** to **University of Alberta.**)

The University reserves to itself the right to change these fees from year to year without notice.

Registration is incomplete until fees have been paid and is subject to cancellation unless payment has been made by final date according to regulations as stated in the section, "Payment of Fees".

When a student withdraws with the approval of his Dean an adjustment will be made on a pro rata basis except that no refunds will be made where withdrawal or cancellation is subsequent to March 31. In the case of a full-time undergraduate student an administrative charge of $10 will be made. In any other case the administrative charge will be the amount of the registration fee.

The following special fees are applicable to all faculties and will be assessed in particular cases as they apply:

For viséing certificates (Not applicable in Graduate Studies.)	
Canadian	$ 5.00
Others	10.00
For transcript of record	1.00
For supplemental examinations, each subject	10.00
For special supplemental examinations, each subject	15.00
For summer reading courses in languages	5.00
Late registration	$3.00+$1.00 per day

UNDERGRADUATE PROGRAMS

I—Full-time Students

General Fees

	Edmonton	Calgary
Students' Union:*		
General	$11.25	$15.25
Building Fund	10.00	6.00
University Athletic Board	7.00	7.00
	$28.25	$28.25

*Full particulars on these fees may be found in the Students' Union Handbook.

Students will be assessed for extraordinary damage to furniture, apparatus, books, etc. Invoices will be submitted when necessary and must be paid before credit will be given for examinations.

NOTE: Student veterans are notified that the late registration fee will *not* be paid by the Department of Veterans' Affairs and must be paid by the student.

Instruction Fees

Faculty of Arts and Science:

(a) B.A.:	
Per session	$215.00
(b) B.Mus.:	
Per session	215.00
(c) B.Sc.:	
Per session	245.00

(d) Diploma in Art:
Per session $215.00

Faculty of Agriculture:
Per session, first and second years 235.00
Per session, subsequent years 245.00

School of Commerce:
Per session 245.00

Arts and Commerce:
Per session, first and second years 215.00
Per session, subsequent years 245.00

Faculty of Dentistry:
(a) Pre-dental course (Arts and Science), first or second year:
Per session 245.00
(b) Faculty of Dentistry:
Per session, first and second years 365.00
Per session, third and fourth years 415.00

Faculty of Education:
Per session, first and second years 205.00
Per session, third and fourth years 225.00

Faculty of Engineering:
Per session, first and second years 285.00
Per session, subsequent years 315.00

Arts and Engineering:
Per session, first, second and third years 245.00
Per session, fourth year 285.00
Per session, subsequent years 315.00

School of Household Economics:
B.Sc. in H.E.:
Per session 245.00

Faculty of Law:
(a) Arts and Law:
Per session, first and second years 215.00
(b) Law:
Per session 265.00

Faculty of Medicine:
(a) M.D.:
Per session, first year 365.00
Per session, second year 475.00
Per session, third and fourth years 525.00
(b) B.Sc. in Medical Laboratory Science:
Per session 245.00
(c) B.Sc. in Medicine:
Per session 200.00

School of Nursing:
(a) Degree course:
Per session, first year 245.00

Per session, intermediate years	Gratis
Per session, final year	$245.00
(b) Diploma course (Public Health or Teaching and Supervision)	245.00

For General Fees, see Section VII of the Nursing Calendar.

Faculty of Pharmacy:

Per session	255.00

School of Physical Education:

Per session	225.00

School of Physical Therapy and Occupational Therapy:

Per session	245.00

II—Part-time Students

General Fees

	1 Course	2 Courses	3 Courses
Registration	$ 2.00	$ 2.00	$ 2.00
Medical Services*	.....	.....	12.00
Students' Union	.....	9.00	21.25
University Athletic board**	7.00	7.00	7.00

*Optional at registration (not available for students taking less than 3 courses).

**Optional at registration.

Instruction Fees

	Full Course	Half Course
Arts and Science	$55.00	$30.00
Education	55.00	30.00
Commerce	55.00	30.00
Household Economics	55.00	30.00
Auditor	12.00	6.00

In all other schools and faculties the fee assessments will be based upon the proportion the hours of instruction in the courses taken bear to the total number of hours of instruction in a normal year's work in the faculty concerned. For the purpose of assessment of fees, students who are taking two-thirds or more of a full year's work will be treated as full time students. In no case will the total fees assessed any special or partial student exceed the total fee for a normal year's work, nor will the minimum assessment for tuition for one full course be less than $55.00.

GRADUATE PROGRAMS

Faculty of Graduate Studies:

General Fees

Registration	$ 8.00
Medical services, optional at registration	12.00
Students' Union and University Athletic Board, optional at registration	28.25

Instruction Fees

Students who have already started masters' programs will note that the method of assessing fees has been changed. Assessment of fee balances under

the new system will not change the total fee for any student who completes his program in the normal time.

Full-time Students

Except where otherwise noted, each fee quoted in the following schedule is the current total instruction fee for the minimum period during which it is possible to complete the degree program. The University reserves the right to change fees without notice. Students who have not completed their programs when a change is made will pay at the new rate for the balance of their programs.

D.Sc. or D.Litt. degree	$200.00
Ph.D. or Ed.D. degrees (Holders of Master's degree) $200.00 a year for two years	400.00
Ph.D. or Ed.D. degrees (Holders of Bachelor's degree) $200.00 a year for three years	600.00
Masters degrees (Holders of Bachelor's degree with honors or of the B.Sc. degree from a four-year undergraduate program) One year at	200.00
Masters degrees (Holders of the B.Ed. degree or of any Bachelor's degree from a three-year undergraduate program) One year at $200.00 and one at $100.00	300.00
Master of Education degrees for which residence credit is obtained at Summer Session, Three Sessions at $100.00	300.00
Subsequent years for all doctoral and masters candidates:	
Extramural	15.00
Intramural	30.00

Special and provisional graduate students taking courses other than those credited toward a degree program will be assessed $55.00 per full course and $30.00 per half course to a maximum of the fee for a full year's program of senior work in the appropriate faculty.

Part-time Students

Part-time students in all categories will be assessed $55.00 per full course and $30.00 per half course up to the amount of the total instruction fee for the full program. Part-time students shall be subject to an extra assessment of $15.00 (extramural) or $30.00 (intramural) for each registration in excess of three. Any outstanding balance will be assessed in the student's final session.

Committee on Degree of Bachelor of Divinity:	
Registration	5.00

For Summer Session fees, see Summer Session Calendar.

EXAMINATION FEES

(a) *Final Examinations*: No fee is levied for final examinations written during regular examination periods.

(b) *Supplemental Examinations*: A fee of $10.00 is charged for each supplemental examination written during a regular supplemental examination period. Applications for September examinations received after August 5 must be accompanied by an additional fee of $5.00 and may not necessarily be accepted.

(c) *Deferred Final Examinations*: A fee of $5.00 is charged for each deferred final written during regular supplemental examination periods. The fee for special deferred finals requiring the setting of special papers is $10.00 per paper.

(d) *Special Supplemental Examinations*: For special supplemental examinations a fee of $15.00 is charged for each subject.

(e) *Outside Centres*: An additional fee of $5.00 per subject is charged for writing supplemental examinations in established Alberta centres other than Edmonton and Calgary.

PAYMENT OF FEES

1. Fees are due and payable immediately after registration. If desired, payment of undergraduate fees may be made in two instalments, in which case an additional charge of $3.00 will be added to the second instalment, except in the Faculties of Medicine and Dentistry, where the charge will be $5.00. The first instalment consists of full General fees and approximately 60% of the Instruction fee.
2. Last dates for instalment payments of undergraduate fees are October 15 and January 14. A penalty of $5.00 will be charged on any payments after these dates. In addition, if payment has not been made by October 31 for first-term fees and January 31 for second-term fees, registration will be subject to cancellation and the student will be excluded from classes.
3. Where students are permitted to register late, either in undergraduate or graduate programs, the last date for payment of fees will be fifteen days after the date of assessment. A penalty of $5.00 will be charged for any payment after this date.
4. Extramural students:
   (a) Registration will not be accepted unless accompanied by the registration fee of $2.00 ($8.00 for graduate students) which is not refundable. Full fees are payable on assessment and if not paid as at November 30, registration will be cancelled.
   (b) If notice of withdrawal is received by the Registrar by November 30, all fees except the registration fee will be refunded. If notice of withdrawal is received *by the Registrar* subsequent to November 30, a *pro rata* charge from October 15 is made and the balance refunded except that no refunds will be made where withdrawal or cancellation is subsequent to March 31.
   (c) A registration may not be carried over from one session to another session. If a student, for any reason other than illness, does not write his examination at the regular time, all fees are forfeited, and in order to be admitted to another examination in that course he must register in another session and pay the full fees. Deferred final examinations may be granted only on the basis of illness verified by a doctor's certificate and must be written at the time of the next regular University examination period.

V—GENERAL REGULATIONS

(a) ACADEMIC REGULATIONS

EXAMINATIONS

Term Examinations

(a) *First-Year Courses*: In first-year courses a definite mark for each student will be reported to the Registrar's Office at the close of the first term. This mark may be computed on the basis of one or more tests or essays or in any way that the instructor may consider satisfactory.

(b) *Senior Courses*: In senior courses the holding of term examinations is optional with the department concerned.

(c) *Distribution of Credits*: In each course where a final examination is held, credit of not less than 30% and not more than 70% will be assigned to term work. The remaining credit in each course will be assigned to the final examination. At the beginning of the session, announcement will be made by each instructor as to the procedure in each case and the distribution of credit.

(d) *Absence from term examinations or tests*: If a student has an unexcused absence from a term examination or test, the mark assigned to him will be zero. However, in case of illness the student may be excused from writing the examination or test. In applying for exemption a student must present an absence card signed by the Infirmary Physician. When exemption is granted the percentage allotted to the examination or test missed is added to the percentage allotted to the final examination.

(e) *Test Weeks*: Although instructors may give tests at any time at their discretion, one week in the middle of each term and one week between terms have been set aside as test weeks to assist in scheduling. During these weeks students will not be excused from classes for extracurricular activities.

Final Examinations

(a) *Final Examinations*: With certain exceptions, a final examination is held in each course. In courses completed in the first term, final examinations may be held either during the test week in January *under departmental supervision,* or at the end of the session, at the discretion of the departments concerned. All other final examinations are held at the end of the session.

(b) *Absence from Final Examinations*: Any student who is ill or suffering from severe domestic affliction is advised not to sit for a final examination. Instead he should advise the Registrar at once of the circumstances and should apply for a deferred final examination to be written at the time of the regular supplementals. Similar action should be taken by any student, who, because of religious convictions or for other cogent reasons, is unable to write a final examination at the scheduled time. Such application will be referred to the student's dean or director for a final decision.

If a student becomes ill or receives word of domestic affliction during the course of an examination, he should report at once to the Supervisor, hand in his unfinished paper and request that it be cancelled. Thereafter, if illness is the cause, he must go directly to the Infirmary so that any subsequent application for a deferred examination may be supported by a medical certificate. The Registrar should be notified of the circumstances in writing within 48 hours of the examination.

Should a student write an examination, hand in his paper for marking, and later report extenuating circumstances to support his request for cancellation of his paper and for another examination, such request will not be entertained.

(c) *Incomplete Laboratory Work*: A student who has not completed laboratory work or assignments in a course may be refused permission to write the final examination.

(d) *Appeals*: Final examination papers may be re-read on an appeal being made to the Registrar within thirty days after the publication of results, accompanied by a fee of $10.00 for each paper; the fee will be refunded if the appeal is sustained—i.e. if the mark is raised from a failure to a pass, or from Class III to Class II. The appeal privilege is limited to two papers.

(e) *Aegrotat Standing*: Aegrotat standing may be granted by the Faculty Council concerned to a student registered in either of the last two years of any course, unless it be in the final year for the first degree in a combined course.

Any student wishing to take advantage of this privilege should apply without delay to the Dean of the faculty concerned. Any other student absent from a final examination because of illness may apply for permission to write the regular supplemental examination (see paragraph (b), above).

(f) *Statement of Record*: After the end of each University session a statement of record is mailed to *each student at the home address specified on his registration.* This should not be expected before June 15.

Supplemental and Deferred Final Examinations

(a) *Supplemental Examinations*: Supplemental examinations are conducted by the University in September of each year (for exceptions, see following paragraph). A student who has failed in a course in the preceding session and who has been granted a supplemental examination should apply to the Registrar not later than August 5, remitting the prescribed fee. Except under special circumstances, no student who has written final examinations will be permitted to sit for a supplemental examination unless he has attained an average of at least 50% on the year's work including the failed subject or subjects. In the faculties of Law, Medicine and Dentistry the average on the year's work must be at least 60%. Any student who returns to the University, having failed a supplemental examination or having neglected to write it, will be required to repeat the course. In certain cases an equivalent course may be prescribed instead of the failed course. The number of supplemental examinations allowed to any student is determined by the Faculty Council concerned. Notification of permission which may be granted to write one or more supplemental examinations is included in the statement of marks sent to all students.

Supplemental examinations for students in the Junior E program, Faculty of Education, will be held in Mid-August, and for Medical and Dental students in the latter part of August. Applications must be submitted to the Registrar at least thirty days before the examinations commence.

(b) *Distribution of Credit*: The percentage of term marks carried forward to a supplemental examination will be determined by the department and faculty concerned.

(c) *Graduating Students*: In the Faculties of Arts and Science, Agriculture, and Education, and in the Schools of Commerce, Household Economics, and Physical Education, second-class standing is required in a specified number of

subjects. This is also the case in the degree course in Medical Laboratory Science. Regulations governing the writing of supplemental examinations to obtain such standing are laid down by these faculties and schools in their own calendars. Subsequent to the degree examinations a member of the graduating class, who having exhausted all the regular supplemental examination priviledges, has still a failure in one course only, may, with permission of the faculty concerned, register in and repeat that course extramurally unless in the opinion of the department concerned a second attendance is necessary. A graduating student who is absent on account of illness from, or who fails in a first term final examination may be allowed a supplemental examination at the end of the session; applications for such examination must be made not later than March 4.

Graduands failing to qualify for their degrees are warned that the University does not guarantee that supplemental examinations will be available for a subsequent indefinite period. In no case will an application for such supplemental examination be considered after three years have elapsed from the time the examination was failed.

(d) *Deferred Final Examinations*: A student who has missed a final examination because of illness or domestic affliction or who is obliged to absent himself from an examination for some other compelling reason (including religious convictions) may apply for a deferred final examination to be written at the time of the regular supplemental examinations (see section (b) under Final Examinations). A student in the Faculty of Medicine, Dentistry or Law who cannot take a first term final examination because of illness will be granted a deferred final examination at the end of the session. This regulation also applies to graduating students. (See section (c) above.) Application for such examination must be made not later than March 5 and must be supported by a satisfactory medical certificate.

(e) *Absence from Supplemental or Deferred Final Examination*: Special supplemental and special deferred final examinations may be granted to students who are prevented by illness (attested by a physician), domestic affliction or other extreme circumstances from writing at the regular time. In addition, special examinations may be granted to a student who is employed during a regular supplemental period, provided his application is approved by his Dean, and provided also that he is able to produce a certificate from his employer to the effect that his services were indispensable at the time the regular supplemental examinations were being written.

(f) *Special Supplemental and Special Deferred Final Examinations*: Special supplemental and special deferred final examinations may be written in October (See Academic Schedule for date). In certain approved cases they may be written during the regular examination periods in March, April, July or August. In each case, application must be made a full month before the examination is to be written.

EXAMINATION RESULTS

After the examination papers have been marked and the final results computed, they must be reviewed by the faculties and recorded in the permanent records before an individual statement can be sent to each student. As this process is time-consuming, students should not expect to receive their statements of marks until about June 15.

DEGREES IN ABSENTIA

Graduands who are unable to be present at Convocation are required to give notice in writing of their intention to be absent. This notice must be received by the Registrar by the date and hour indicated in the Academic Schedule. Any student who fails to give notice as required will be assessed a penalty of $10.00 prior to release of his or her parchment. A graduand may be excused from the payment of this fee if his absence without notice is due to sudden illness, accident, domestic affliction or other reason deemed valid by the Registrar.

GRADING SYSTEM

Students' marks are graded as follows: 80% and over, Class I; 65% to 79%, Class II; 50% to 64%, Class III. For students proceeding toward an undergraduate degree the pass mark is 50% unless otherwise specified; in courses taken toward a graduate degree the pass mark is 65%.

ACADEMIC HONORS

First-Class Standing

First-class standing in a given year is awarded to any student who secures an average mark of not less than 80% in the work of that year.

First-Class General Standing

First-class general standing will be awarded to, and will be inscribed upon the degree parchment of, any student who secures first-class standing in the years specified in the following schedule:

Degree	*Qualifying Period*
B.A., or B.Sc. (Arts) or B.Com.	Years, I, II and III of the general course.
B.Sc. (H.Ec.)	Years I, II and III.
B.A. in B.A., LL.B. course	Arts and Science I and II, Law I.
B.A. in B.A., B.Sc. (Engineering course)	Years, I, II and III.
B.A. in B.A., B.Com. course	Years, I, II and III.
B.Com. in B.A., B.Com. course	Years III, IV and V.
D.D.S.	Any three years, and an average of 80% or more during the four years of the program.
M.D.	As for D.D.S.
B.Ed. and B.P.E.	Any *two* years, and an average of 80% or more during the last three years of the B.Ed. program (two and one-half years for the old high school program) or during all three years of the B.P.E. program.
LL.B.	Years I, II and III of Law.
B.Sc. (Nursing)	Years I and V and an average of 80% or more in II, III and IV.
B.Sc. (Pharmacy)	Years I, II and III.

DEGREES WITH HONORS

The Faculty of Arts and Science

A student with approved qualifications may proceed to the degree of Bachelor of Arts or Bachelor of Science with honors by following a more concentrated course of study in a special field under the supervision of one of the departments.

The time required for an honors degree is four years from senior matriculation. A student may apply for admission to an honors course at the beginning of either the first or second year, but formal admission to honors comes at the beginning of the second year.

Honors degrees are awarded in two classes, first-class honors and honors. For first-class honors, an average of 80% is required; for honors, 65%. In awarding honors, the entire university record of the student is considered.

DEGREES WITH DISTINCTION

The Faculty of Agriculture

The degree of Bachelor of Science in Agriculture with high distinction or with distinction may, at the discretion of the faculty, be awarded to a student who has made a scholastic record of distinctive merit during the last two full years of work. To be eligible for the degree with distinction, the student must have a weighted average of not less than 80%. When the weighted average mark for the last two year's work is 85% or more, a student is eligible for consideration for a degree with high distinction.

The Faculty of Engineering

The notation "with high distinction" will be made on the records and parchments of those students who have secured an average of not less than 85% in the prescribed work of the two years preceding graduation; the notation "with distinction" will be made when the average is 75% to 84%.

The Faculty of Law

Students who have given evidence of a high standard of scholarship during their first year of Law may be permitted, with the approval of the faculty, to take any two of the following subjects in addition to the work ordinarily required in the second and third years in Law:

(a) Legal Psychology;
(b) Corporation Finance (Economics 370);
(c) Political Science (Pol. Sci. 310);
(d) Public International Law;
(e) Roman Law.

Students who have been permitttd by the Faculty of Law to take courses leading to the degree of Bachelor of Laws with Distinction may, on special application to the Faculty of Law, be permitted to substitute one or more courses in lieu of one or more of the additional distinction subjects enumerated above.

If the work of such students in the two extra subjects so taken and in the courses of the second and third years in Law indicates a high standard of

scholarship, such students may, with the approval of the faculty, be granted the degree of Bachelor of Laws with Distinction.

RESIDENCE REQUIREMENTS

A student proceeding towards a first degree will normally be required to attend at least one academic year as a full-time student.

PROMOTION REGULATIONS

Full details of special promotion regulations of the various faculties and schools will be found in pages relating to the faculty or school.

UNSATISFACTORY STANDING

A freshman student whose matriculation record is weak may be warned of this fact at the outset of the session. A freshman student whose record in this first term is deemed unsatisfactory will be so notified by his Dean or Director. Appropriate steps will be taken to assist the student to improve his standing.

The records of all students in the University are reviewed at the end of each session. A student whose record is then unsatisfactory will be notified by his Dean or Director and will be referred to Student Counselling Services for recounselling.

A student whose record is extremely unsatisfactory may not re-enter the University without re-counselling. Such a student who seeks re-admission to the University must report his intention by letter or in person to the Director, Student Counselling Services, not later than August 1st.

A student with an extremely unsatisfactory record at another University will not be considered for admission until at least a year has elapsed from the date of his leaving that institution. Thereafter, the procedure outlined above will apply.

The General Faculty Council may refuse permission to a student or prospective student to enter any year of any course if, in the opinion of the Council, the student shows a lack of general educational attainment. Further, a student whose record in the classroom, in tests, or in final examinations is unsatisfactory, may at any time be required to withdraw from the University.

RELATION OF SCHOLASTIC STANDING TO EXTRACURRICULAR ACTIVITIES

To be eligible (1) to represent the University in any competition with outside organizations, (2) to participate in non-competitive University activities which are open to the general public, or (3) to hold office in a student organization, a student must be a bona-fide student, and meet the requirements of *satisfactory scholastic standing.*

Bona-fide students are:

(i) students doing full undergraduate work in the University; or

(ii) graduate students in attendance carrying a full year's work leading to a degree; or

(iii) students in affiliated colleges carrying a full year's work leading to a diploma or certificate and taking two full courses of University grade in the University.

Bona-fide students may assume that they are scholastically eligibile to participate in the activities listed above unless they are informed otherwise by their Deans or Directors. However, men students desiring to participate in events sponsored by the Western Canadian Intercollegiate Athletic Union, must meet the requirements of scholastic standing laid down by that body.

If a student feels at any time that there are circumstances which might have a bearing on his eligibility to participate, he should consult the Dean of his faculty or the Director of his school as soon as possible and explain these circumstances to him.

APPEALS

A student may present an appeal to the respective Council or Administrative Committee concerned through the Dean or Director.

The General Faculty Council has power to hear and determine appeals from the decisions of the Faculty Council upon application by members or by students and others. Such appeals should be addressed to the Registrar, Secretary of the General Faculty Council.

(b) ATTENDANCE AND CONDUCT

ATTENDANCE

(a) Regular attendance is expected of students in all courses. Students having an inordinate number of unexcused absences from a course may be refused permission to take the final examination.

(b) Absences are counted from the first day of the session.

(c) Students who are late for any lecture or laboratory period will be marked absent unless at the end of the period in question they account satisfactorily to the instructor for their lateness.

(d) Illness and Physical Disability:

(1) Students who are absent from two or more consecutive classes in a course because of illness or disability should report to their instructor upon their return to class. If the instructor requires an absence card, it will be the student's responsibility to have one certified by the Infirmary Physician, and to show it to the instructor before depositing it with the Registrar.

(2) Absence from term or final examinations—see paragraph (d) top page 26 and paragraph (b) lower page 26.

(e) Students who are absent from two or more consecutive classes in a course for some valid reason other than illness should report to their instructor upon their return to class. If the instructor requires an absence card, it will be the student's responsibility to have one signed by the Registrar and to show it to the instructor before depositing it with the Registrar.

(f) Students desiring leave of absence in any given course must communicate their desire to the Registrar. At the end of such a period of absence, the student must present an absence card for the Registrar's signature.

STUDENT CONDUCT AND DISCIPLINE

When a student enters the University, it is expected that he will apply himself to his studies and conduct himself with propriety. Should a student fail to live up to these expectations, the University reserves the right to take such action as, in its opinion, his case warrants. The penalty of expulsion may be applied.

1—The Deans' Council

Although the Senate exercises jurisdiction in a general way over the conduct of students in attendance at the University, the actual day-by-day administration of student discipline has since 1942 been vested in the Deans' Council, and in those persons and bodies to which its authority has been delegated.

2—The Provost and the Dean of Women

The Provost of the University exercises general supervision over the conduct and welfare of the students. He is Secretary of the Deans' Council and of the Committee on Student Affairs, and Chairman of the General Residence Committee. He works in cooperation with the Dean of Women.

3—The Disciplinary Committee of the Students' Union

The Students' Union is concerned with all matters of discipline and is, as a matter of policy, given the first opportunity to deal with any disciplinary issue that may arise. For this purpose it has set up a Disciplinary Committee.

4—The Wardens and the General Residence Committee

The Residence Wardens are staff members appointed by the Board of Governors. In conjunction with the General Residence Committee, they are responsible for student discipline within the residences.

SPECIAL REGULATIONS OF THE BOARD OF GOVERNORS

(a) All interference on the part of any student with the personal liberty of another or any conduct on the part of any student subjecting another student to any indignity or personal violence is forbidden. No initiation ceremony involving physical violence, hazing, personal indignity, interference with personal liberty or destruction of property may be held within the buildings or on the grounds of the University, such student activities being expressly forbidden under penalty of suspension or expulsion.

The University authorities will not be responsible for any accident or illness of any kind occasioned to any student while engaged in or being subjected to any such activities.

(b) In the case of dishonesty or any serious indiscipline in the classroom, the instructor has the authority of suspension from the classroom. Further action is to be taken by a committee consisting of the Provost and the department and Dean concerned.

(c) The use of, bringing or having of liquor on University premises, including residences, is strictly prohibited.

(d) The Board of Governors considers the raiding or unlawful entry of residences as a very grave offence. Any such occurrence will be reported to and dealt with by the Board.

VI—STUDENT SERVICES AND STUDENT AFFAIRS

STUDENT COUNSELLING SERVICES

This is a counselling service staffed by professionally trained counsellors for university students and for prospective students. There is an office in Edmonton and in Calgary and the counselling services in both centers operate throughout the year.

Prospective students write or come in regarding choice of university program and vocational planning. Appointments should be arranged in the second term of the Grade XII year or during the following summer. The bulletin "Information for Prospective University Students" has been prepared to answer questions commonly asked.

University students make use of the service regarding choice of program, vocational planning, personal matters and progress with studies.

(1) *Testing Service.* A few basic tests are given to all incoming freshmen at the time of registration. Vocational inventories and other individual tests are given when it appears that these may be helpful to the student.

(2) *Study Skills.* A series of study tutorials is arranged each session for new students.

(3) *Vocational Planning.* Students often consult about future plans, including further possible professional training.

(4) *Student Housing Service.* See Calendar page 38 for Living Accommodation.

(5) *Financial Aid.* The counsellor in Calgary acts for the Administrator of Student Awards in all matters concerning financial aid.

(6) *Personal Problems.* Occasionally a student's performance suffers because of worry, restlessness, inability to concentrate, or preoccupation with personal problems. In these circumstances, the student should consult a counsellor as soon as possible.

(7) *Change of Faculty.* Students contemplating a change of School or Faculty are advised to consult a counsellor. This should be done well before the opening of the session.

(8) *Withdrawal from the University.* Any student who for any reason is contemplating withdrawal from the University should immediately arrange an interview with a counsellor.

(9) *Unsatisfactory Standing.* Re-counselling is advised and, in the case of extremely poor standing, is required. See page 33.

Address enquiries to Student Counselling Services, University of Alberta, Edmonton (or Calgary). The Edmonton office is in the Administration Building on the Campus; telephone GE 9-4951, Extension 412 or 229.

STUDENT MEDICAL SERVICES

A Student Medical Services Fund is maintained by an annual appropriation from fee revenue. This trust fund is administered by a committee consisting of a Chairman, the Medical Director, the Infirmary Physician, the Bursar, the Director of Student Counselling Services, the President of the Students' Union, the President of the Wauneita Society, the Treasurer of the Students' Union and the Chairman of one House Committee. All undergraduate students are entitled to medical treatment under such conditions and provisions as have been outlined in specially printed pamphlets, copies of which will be furnished to students on payment of fees. Every student should read these instructions carefully.

PHYSICAL EDUCATION SERVICE PROGRAM

It is the aim of the School of Physical Education to make a major contribution toward the physical, mental and social life of each student through instruction and participation in physical and recreational activities.

All first-year students are required to take two hours of physical education per week. Those excepted from this regulation are:

1. students declared physically unfit by the University Medical Services;
2. students over 25 years of age.

Individual lockers, locks, towels and shower facilities are available for all students. The program is conducted in the University Gymnasium.

The prescribed gymnasium costume is:

Women:	*Men*:
Shorts (dark green)	Shorts
T-shirt (white)	T-shirt
Socks (white)	Running shoes
Running shoes (white)	

Shorts and T-shirts may be purchased at the University Bookstore.

STUDENT EMPLOYMENT SERVICE

The National Employment Service maintains an office in the Administration building. The University Committee on Student Employment cooperates with this service in securing employment for both undergraduates and graduates.

RESIDENCES

Residential accommodation is provided in the University Residence Halls for approximately 450 students. Applications for reservations, accompanied by ten dollars ($10.00), should be forwarded to the Bursar. Reservations will not be held after the respective dates of registration.

Students who make application for and are assigned rooms must understand that they are in fact agreeing to remain in residence for the full academic session.

Each student to whom a room is assigned will be required to deposit one dollar ($1.00) for keys.

Charges for Room and Board will be made at the following rates:

	Single Room	Double Room
Monthly charge	$75.00	$70.00
Daily rate (used for fractional periods)	2.50	2.35

Students leaving during the Christmas holidays will receive a rebate of 90c per day for board for each day's absence from December 23 to January 2, inclusive. This amount will be credited to the respective room and board accounts.

Payment of room and board charges must be made on or before the first day of each month.

A limited amount of accommodation is available in St. Stephen's College and St. Joseph's College. Details can be secured by writing directly to the colleges.

STUDENT HOUSING SERVICE

While the University authorities cannot accept responsibility for finding suitable accommodation for students, they are anxious to give whatever assistance they can in the matter. A special service in this regard has been provided. *Student Housing Service* prepares lists of rooms prior to the summer session and to the regular session and these lists may be consulted by students looking for such accommodation. The service operates as a part of the Student Counselling Services and is located in the Administration Building. The housing phone is GE 9-4951, Extension 385. In Calgary, lists of rooms are available in the General Office.

The University Cafeteria provides a full meal and restaurant service for the convenience of students, and in addition the Snack Bar in the Students' Union Building is open during hours adapted to their needs.

STUDENT AWARDS

The Administrator is Mr. R. B. Wishart. His office is on the second floor of the Administration Building, and his telephone number is GE 9-4951, Extension 495. He administers not only University awards but also those made under the Students Assistance Act. For further information, see the Awards Section of the Calendar.

THE BOOKSTORE

For the convenience of students, the University maintains a bookstore where textbooks prescribed in the university calendar may be obtained. Stationery, drawing materials, gymnasium wear and other accessories are also available at special student prices.

RAILWAY RATES

Students attending University are entitled to reduced fares and should apply to their local ticket agents for special student tickets. These tickets must be countersigned by the Bursar for the return journey at the end of the session.

STUDENT GOVERNMENT

A long-standing duty and prerogative of the University Senate has been to make provision for student self-government on the campus.

To this end it established a Committee on Student Affairs in 1911. A similar committee was formed for the Calgary Branch in 1950.

The Committee on Student Affairs ratifies the Constitution of the Students' Union and receives twice yearly reports on the Union's activities. All registered students become members of the Students' Union on payment of their general fees.

Besides authorizing the activities of the Students' Union, the Committee on Student Affairs interests itself in student extracurricular life in general.

The students in residence elect members to a General Residence Committee with subcommittees for matters relating solely to the men and women students. Originally under the direct control of the Board of Governors, the General Residence Committee has since 1942 been a standing committee appointed by the Deans' Council.

THE INTRAMURAL SPORTS PROGRAM

The School of Physical Education, with the cooperation of the University Athletic Board, organizes and administers a comprehensive program of intramural sports. A primary purpose of the program is to encourage sportsmanship and friendly relations among the students of the University through athletic competition. Individual and group competitive sports for men and women include tennis, golf, track and field, cross-country running, basketball, hockey, volleyball, touch football, table tennis, swimming and figure skating. Facilities include gymnasiums, swimming pool, ice arena and outdoor playing fields.

INTERCOLLEGIATE ATHLETICS

As a member of the Western Canada Intercollegiate Athletic Union, the University provides opportunities for men and women to compete in intercollegiate sports. Included in the activities for men are golf, tennis, cross-country, badminton, volleyball, basketball, football, hockey, wrestling, swimming and curling. Women compete in tennis, golf and badminton and hold two sports weekends with member universities. Basketball and curling are played during one weekend and volleyball, swimming and figure skating during the other.

UNIVERSITY NAVAL TRAINING DIVISION

Object

University Naval Training Divisions have been instituted by the Royal Canadian Navy in Universities across Canada to provide an opportunity for suitable young men to perform officers' training while they are undergraduates and thereby prepare themselves for promotion to commissioned rank in the Regular Force or the Reserve on graduation. On joining the U.N.T.D., a student becomes a member of the Royal Canadian Navy (Reserve).

Training

The U.N.T.D. course is of three years duration, each year of which is governed by a different syllabus. First year students are entered in the U.N.T.D. as Probationary Cadets and are promoted to Officer Cadet on passing a selection board during the first year of the course. Sixty-four hours of training during each of the three academic years, and two summer training periods of at least 14

weeks' duration each are required in order to quality for a commission. Summer training takes place at the east and west coasts and afloat in training ships.

Depending on what degree course a student is registered in, he would become an Officer Cadet in one of the following branches of the naval service: Executive, Engineering, Electrical, Ordnance, Constructor, Instructor, Medical, Supply or Medical Technical Branch.

Pay

U.N.T.D. Officer Cadets are paid $210 per month, all found, for all summer training and up to 16 days' pay for winter training. Uniforms are supplied, as is transportation and medical care during the summer.

Commissions in the Royal Canadian Navy

Freshmen starting University may apply for the R.C.N. Regular Force and Officer Cadets may transfer from the U.N.T.D. to the R.C.N. Regular Force and train for a permanent commission. Application can be made at any time during their University training, subject to the following conditions:

(a) Under 21 years of age on the first of January of the year of entry to University.

(b) Have reached an academic standing of Senior Matriculation or its equivalent.

(c) Have successfully completed University courses and U.N.T.D. training to date of application (the latter being applicable only in transfer from the U.N.T.D.).

(d) Are taking courses required for the branch for which application is made. (Two years of mathematics through differential and integral calculus; and two years of physics is required.)

Terms of Service

(a) Free tuition, books, instruments, uniforms.

(b) Free rations and quarters, or allowance in lieu. Medical and dental care.

(c) Obligation to remain in good standing academically, to carry out naval training successfully and to show promise of developing into a satisfactory officer.

(d) Obligation to serve in the Regular Force for at least three years after leaving University.

For further information, consult the Staff Officer, HMCS Nonsuch or Armed Forces Liaison Officer, University Gymnasium.

CANADIAN OFFICERS' TRAINING CORPS (University of Alberta Contingent)

Program

The C.O.T.C. trains undergraduates for commissions in the Canadian Army (Regular or Militia). There are two phases of training: the *theoretical,* which is taken during the academic year and consists of lectures on organization and tactics, administration. leadership, military history and military law; and the *practical,* which is taken during the summer vacation with schools and units of the Canadian Army. The theoretical work is covered by two or three hours of

lectures one night per week during the winter for a total of 64 hours. The practical work is done during a summer training period of twelve to twenty-two weeks duration.

Qualification

A student qualifies as a Second Lieutenant when he has taken two theoretical and two practical phases of training. By taking a third theoretical and a third practical phase he may qualify as a Lieutenant (Regular or Militia) and be promoted to that rank when he has obtained a degree.

Eligibility

Applications for training may be made by male undergraduates who are:

1. British subjects,
2. physically fit and between the ages of 17 and that which will permit him to complete the minimum qualification of 2nd Lieutenant before reaching the age limit shown below,
3. following a course of studies leading to a recognized degree.

Since C.O.T.C. training is related to the student's university course as closely as possible, the following limitations apply to entrance into corps:

		Age Limit
Royal Canadian Armoured Corps	Any faculty	30
Royal Canadian Artillery	Any faculty	30
Royal Canadian Engineers	Engineering	35
Royal Canadian Corps of Signals	Electrical Engineering, Eng. Physics	35
Royal Canadian Infantry Corps	Any faculty	30
Royal Canadian Army Service Corps	Any faculty: Commerce, Agriculture, Veterinary Science, or Mechanical, Civil or Chemical Engineering being preferred	30
Royal Canadian Electrical and Mechanical Engineers	Engineering	35
Royal Canadian Army Medical Corps	Medicine or Pharmacy	35
Royal Canadian Dental Corps	Dentistry	35
Royal Canadian Ordnance Corps	Any faculty: Arts and Science and Commerce preferred	35
Royal Canadian Army Pay Corps	Any faculty: Commerce or Economics preferred	35
Canadian Provost Corps	Any faculty; Law preferred	35
Canadian Intelligence Corps	Any faculty	30-35
Royal Canadian Army Chaplain Corps	Pre-Theology	35

Application

Candidates will apply to the C.O.T.C. Orderly Room. Subsequently they will be interviewed by the Officer Selection Board. Suitable candidates will begin their theoretical training as soon as accepted.

Status and Pay

Successful candidates are appointed Officer Cadets with the status and privileges of Second Lieutenants. While at corps schools, they receive pay of

that rank, i.e. $210 per month in addition to rations and quarters. By attending the 64 hours of lectures in each theoretical phase, the officer cadet can earn 16 days' pay (approximately $100).

ROYAL CANADIAN AIR FORCE (University Squadron)

Object

R.C.A.F. University Squadrons were formed at the major Canadian universities to promote a strong liaison and mutual understanding between the universities and the Royal Canadian Air Force. These squadrons will provide a flow of trained university graduates into the R.C.A.F. Regular or Reserve as commissioned officers.

Qualifications

Applicants for the University Squadron must possess the following qualifications:

(a) Canadian or British subject, male or female.
(b) Unmarried, if applying for aircrew.
(c) Age—17 to 25 years for aircrew: 17 (18 for women applicants) to 26 years for non-flying branches.
(d) Medical category as established by the R.C.A.F.

Application

Application forms may be obtained from the Commanding Officer. The selection of Flight Cadets for the University Squadron will commence at the beginning of the fall term.

Training Program

The three-year training program consists of formal training and supervised employment at R.C.A.F. schools and stations for a minimum of sixteen weeks and a maximum of twenty-two weeks each summer. In addition, Flight Cadet and Pilot Officer members of the University Squadron attend weekly lectures and parades during each of the three winter terms preceding summer training.

Officer Development

During the first summer of training, all Flight Cadets undergo an initial Basic Officer Development Course at the R.C.A.F. Reserve Officers' School, in which they receive instruction in the duties, requirements and responsibilities of junior officers. This training involves the military, executive and developmental phases, which, besides the military and executive aspects of the R.C.A.F., are designed to train students as leaders who are well informed in world affairs and the role of Canada's defence forces in the current political and military situation, who are able to express themselves clearly and effectively, and who will make good officers and good citizens.

Formal Training

Aircrew trainees, most technical list and some non-technical U.R.T.P. Flight Cadets, on completion of the Basic Officer Development Course, proceed to R.C.A.F. schools to commence formal Air Force courses in their designated branches.

Aircrew

R.O.T.P. Cadets, only, may be enlisted in aircrew branches.

Candidates for flying branches must be over 24 years of age on the date of application, must meet aircrew medical standards, and must not be married while undergoing flying training.

Winter Training Program

During the academic year, members of the University Squadron attend weekly lectures on orientation, executive and officer development subjects. The first winter's lectures are preparatory to entry into U.R.T.P. and the Air Force. Lectures given during the second and third winters extend and amplify knowledge acquired during the officer development phases of summer training. Emphasis is placed on the integration of social and military sciences and the determination of their application to current affairs.

Officer Employment

Flight Cadets in those branches for which formal courses are not given during the summer months are employed in an "understudy" capacity at various units. This employment, which commences at the Officer Development Course, provides the students with experience in Air Force procedure and operation and allows them to observe the application of what they are taught at the Reserve Officers' School.

Status

Accepted university students are appointed in the R.C.A.F. Primary Reserve (special list, University Branch) in the rank of Flight Cadet.

Flight Cadets have the status of commissioned officers for all purposes and wear the rank of Pilot officer.

After successful completion of three summers of training and subsequent graduation from university, Pilot Officers may be appointed to the R.C.A.F. Regular, Auxiliary or Supplementary Reserve in the rank of Flying Officer.

Pay

Flight Cadets are paid at the rates prevailing for pilot officer. Net earnings for each summer employed vary between $750 and $1,200, depending on the length of duty. Aircrew trainees receive an additional $75 per month while undergoing aircrew training. Winter pay is according to attendance at lectures and parades and amounts to approximately $100 if all sessions are attended.

Medical and dental care is provided during summer employment and first-class rail transportation is issued on posting. Flight Cadets are issued with full kit of uniform for summer and winter wear upon acceptance.

For detailed information concerning Reserve University Squadron and R.C.A.F. (Regular), consult the Commanding Officer of the Squadron.

FINANCIAL ASSISTANCE

For the Regular Officer Training Plan and the Medical and Dental Corps Subsidization Plans, students are referred to the chapter on Academic Awards and Financial Assistance.

VII

The Faculty of Arts and Science

INFORMATION, REGULATIONS, COURSES

OFFICERS OF THE FACULTY OF ARTS AND SCIENCE

Dean—D. E. Smith
Assistant Deans—F. D. Blackley
E. F. Guy (Calgary)
Faculty Secretary—J. J. Stewart

MATRICULATION

The examinations for admission to the University of Alberta are the regular Alberta Grade XII Departmental Examinations held each year in June and August. Applications for these examinations should be made about two months before the date of the examinations, to the *Chairman of the High School and University Matriculation Examinations Board, Department of Education, Administration Building, Edmonton.*

Students whose matriculation has not been completed in the June examinations are urged to attend the Red Deer Summer Session operated by the Correspondence School Branch of the Department of Education, and to remove their deficiencies by writing the Grade XII supplemental examinations in August. High School students who are unable to obtain instruction in all the subjects of matriculation at their local High School are advised to register for such courses with the Correspondence School Branch in Edmonton, as soon as possible after the commencement of their final High School year.

Certain courses at the Grade XII level, normally offered to students who are beginning their study of a particular subject, sometimes may be taken at the university for the purpose of removing a matriculation deficiency. With the consent of the Dean, students with good High School records may be allowed to take *one* such course. They must satisfy the general matriculation requirements in every other respect, and present evidence that the matriculation course needed for University entrance was not available in their school. When taken for this purpose, such a course will not count toward a University degree.

Students of mature age whose high school preparation has not been regular may in certain circumstances be excused from presenting a high school diploma. Such students should apply to the Registrar for specific information.

Students who have completed matriculation in accordance with the requirements set forth in previous calendars should submit their credits for evaluation.

Students seeking credit for matriculation courses taken outside Alberta should submit their documents to the Registrar of the University for evaluation. A fee of five dollars is charged for this service if the documents are issued in Canada, and ten dollars if issued in other countries. The University reserves the right to prescribe additional examinations where there is doubt about such credits.

General Requirements

Students from the high schools of Alberta seeking admission to the University must possess—

(a) a High School diploma with
(b) "B" or higher standing in the required courses of Grade XII (see below), and
(c) an average in these courses of at least 60%.

Faculty of Arts and Science

For a *B.A.* program, the general requirements with credit in—

1. English 30.
2. Social Studies 30.
3. Mathematics 30.
4. French 30 or German 30 or Latin 30.

5 and 6. *Two* of: Chemistry 30, Physics 30, Biology 32, French 30 or German 30 or Latin 30.

For a *B.Sc.* program, the general requirements with credit in—

1. English 30.
2. Social Studies 30.

*3. Mathematics 30.

4. French 30 or German 30 or Latin 30.

5 and 6. *Two* of: Chemistry 30, Physics 30, Biology 32,.

(Students planning to major in science should have Chemistry 30 and Physics 30 where possible.)

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*Mathematics 31 (Trigonometry) with B standing or better will also be required for admission to all B.Sc. programs in the physical sciences (chemistry, geology, mathematics and physics).

For the B.Mus. program, the general requirements with credit in—

1. English 30.
2. Social Studies 30.
3. Mathematics 30.
4. French 30 or German 30 or Latin 30.

5 and 6. Two of: Chemistry 30, Physics 30, Biology 30, French 30 or German 30 or Latin 30.

7. In music subjects, the completion of Grade VIII practical and Grades IV and V theoretical of the Western Board of Music examinations or equivalent standing.

These general regulations notwithstanding, the University may, at its discretion, refuse admission to any applicant.

NOTE: Students who completed High School Grade XII in 1954 or earlier will be given full consideration. They are advised to write or to see the Registrar of the University and to provide him with complete transcripts of their high school records.

Candidates from outside of Alberta will be required to meet equivalent standards.

The Committee on First-Year Students

First-year students of all faculties except Dentistry, Law and Medicine are under the jurisdiction of the Committee on First-Year Students.

PROMOTION REGULATIONS

Since students' fees cover less than one-third of the cost to the province of their university education, the administration is in duty bound to see to it that only those students remain in the University who make effective use of its facilities.

General

1. In the case of a student adversely affected by these regulations the Faculty Council takes into consideration all circumstances within its knowledge which might justify any deviation from the regulations.
2. The pass mark in each subject is 50% except where otherwise specified.

Faculty Regulations

Promotion of the student from the first to the second year is contingent on the satisfactory completion in one year of a first-year program of normal weight. This regulation applies also to students transferring from other universities. For promotion to the second year in the combined courses of Arts and any one of Commerce, Law and Engineering, the student must pass all prescribed courses of the first year and obtain a general average of 60%.

No supplemental examinations are permitted to raise the first-year average for the purpose of gaining promotion.

PROGRAMS OF STUDY

The Faculty of Arts and Science offers honors courses and general courses leading to the degrees of Bachelor of Arts (B.A.), Bachelor of Science (B.Sc.), Bachelor of Commerce (B.Com.), Bachelor of Music (B.Mus.), and Bachelor of Science in Household Economics. It also offers a course leading to the combined degrees of Bachelor of Arts and Bachelor of Commerce and is associated with other faculties in courses leading to the combined degrees of Bachelor of Arts and Bachelor of Laws, and Bachelor of Arts and Bachelor of Science in Engineering. Courses leading to a diploma and an intermediate diploma in Art are also offered. The faculty includes the Schools of Commerce and Household Economics.

The entrance requirements for the courses leading to the various degrees may be found in the statement on matriculation.

Students registering for their first year will select a particular subject of concentration, and will register either in the pattern of the general course or in the honors program as prescribed for that subject.

The honors programs lead to the B.A. or B.Sc. degree "with honors" in a particular subject or subjects, in four years. They are designed to provide specialization in that subject or subjects together with a longer training than in the general course, as well as the higher standard suggested by the term "honors". A student need not commit himself in his first year, and may register in the appropriate pattern of the first year of the general course. If he obtains a sufficiently high standing and is recommended by the department concerned, he may then commence the corresponding honors program in the second year. A student who wishes to register in an honors program in the first year must obtain the approval of the department in which he plans to specialize. Outlines of honors programs and regulations concerning honors courses are given on later pages of this calendar.

The general course leads to a B.A. or B.Sc degree in three years. It is designed to give students a general education, with a certain amount of concentration on one or two subjects. In their second and third years students will register as prescribed for the pattern selected in the first year, and their choice of courses must be approved by the department in which they are concentrating. Students may change from one pattern to another with permission of the Dean. Pattern programs are outlined on later pages of this calendar.

The courses in Arts and Science are classified in three divisions as follows:

Division A

Art
Classics 350, 351, and 354
Drama
English
General Linguistics 400
French
German
Greek
Hebrew (St. Stephen's College)
Household Economics 350
Latin
Music
Old and New Testament Literature
Romance Literature 350
Russian
Russian Literature in English 350
Spanish
Ukrainian

Division B

Classics 352, 353, 355, 356, and 357
Christian Apologetics 366 (St. Joseph's College)
Economics
Education
Geography 200, 300, 302, 400, 402, 404, 406, 408, 410
History
Philosophy
Political Science
Psychology
Sociology

Division C

Astronomy
Bacteriology (including Microbiology)
Biochemistry
Biology
Botany
Chemistry
Clinical Pathology
Entomology
Genetics
Geography 201 (Physical Geography), 301, 301, 403
Geology
Household Economics 210
Mathematics
Physical Science
Physics
Physiology
Statistics
Zoology

Courses numbered 100 to 299 inclusive, described as junior, are open to first-year students and are also available as options in senior years of certain patterns. Courses

numbered 300 to 499, described as senior, are designed primarily for students beyond the first year at University. Those numbered 500 or higher are open mainly to honors and graduate students. For further information, particularly in the matter of prerequisites, students are advised to consult the section of the calendar containing detailed descriptions of courses.

Degrees with Honors in the Faculty of Arts and Science

A student with approved qualifications may proceed, under the supervision of one of the departments, to the degree of Bachelor of Arts or Bachelor of Science with honors, by following a course of study which is largely concentrated on one or two subjects. The time required for an honors degree is four years from senior matriculation, and the course may be interrupted only by special permission of the Council of the Faculty upon the recommendation of the committee on honors. The courses in honors are administered by the Dean and a committee of the Faculty of Arts and Science.

Some departments provide a special first-year program for students who wish to take honors, although in most departments the difference between the honors program and the general course does not appear until the second year. Permission to take a first-year honors program is granted to students with high matriculation standing and with the approval of the department concerned. Application for this privilege should be made through the head of the department at the time of registration. A student who, in his first year, takes one of these special programs and fails to make the standing necessary for continuance in honors, or decides not to attempt honors, must continue in an appropriate pattern of the general course and must subsequently complete all the requirements of that pattern. The special first-year programs are so designed that a student can proceed in this way without penalty, by some adjustment in the second and third years.

Students with satisfactory standing may proceed from the first year in a pattern of the general course to the second year of the honors program. A student desiring to do so must apply through the head of the department to the Dean, preferably during his first year and not later than the time of registration for his second year.

Promotion from first year to second year, as well as from second to third and third to fourth, is by recommendation of the department concerned, for which an average of 65% or higher is usually required. A student who is not recommended to continue honors at the end of his second year will be transferred to the general course. He must arrange his program to comply with the general regulations.

A student who is not recommended to continue honors at the end of his third year, or who fails to complete the requirements for honors in his fourth year, will be granted a pass degree forthwith, provided that the courses he has taken and the standing attained therein comply with the general regulations for the general course. Otherwise he may be required to take one or more additional courses in a subsequent summer or winter session. A student who, for any reason, is unable to return for the fourth year may apply for a pass degree under the same conditions.

In all years a student's program must be approved by his department, subject to the following general provisions:

1. A student is not permitted to confine his studies to one of divisions A, B, C

but must, during his first three years, take at least three courses outside the division to which his honors subject belongs.

2. In the third and fourth years a good deal of latitude is permitted in order to meet the needs of individual students. A student may choose whether to concentrate closely on one subject or whether to widen his field of study. In the latter case he will not be required to take, over the four years, more than ten courses in the subject of concentration.
3. German 210 or Russian 210 is permitted for credit as an approved option in any year.
4. The term "option", where it appears in the programs, should be construed as a course freely chosen by the student, provided that he has any necessary prerequisites or corequisites. An "approved option" should be construed as an option approved by the department directing the program of the student concerned.

At the end of the fourth year some departments require candidates for honors to take a final comprehensive examination as well as examinations in the courses prescribed for the year; other departments set final comprehensive examinations covering all the work of the senior years, but do not require examinations in courses taken in the final year.

Honors are awarded in two classes, first-class honors and honors. For first-class honors an average of 80% is required; for honors 65%. In awarding honors the entire university record of the student may be considered.

The prescriptions of the departments for the courses in honors follow.

DEPARTMENT OF BIOCHEMISTRY

Honors in Biochemistry

In the Honors program in Biochemistry opportunity will be given, in the choice of options, for concentration in various areas of Biochemistry.

First Year (beginning in 1959-60)

Chemistry 230, Chemistry 250, Mathematics 200 or 201, Physics 240, English 200 or 210 (or the language of matriculation), Physical Education.

Second Year (beginning 1960-61)

Botany 201 or Zoology 220, Chemistry 312, Mathematics 304, Physics 340, an option from Division A or B (German 210 or Russian 210 recommended).

Third Year (beginning 1961-62)

Biochemistry 300 or 350, Chemistry 372, Chemistry 450 or 550, an option from Division C, an option from Division A or B.

Fourth Year (beginning 1962-63)

Two graduate half-courses in Biochemistry, Biochemistry 501, three options.

Students wishing to major in Animal Biochemistry must take Biochemistry 300 and 400 and Physiology 361. Those wishing to major in Plant Biochemistry must take Botany 201 and Biochemistry 350. Other combinations of courses will be considered. Recommended C options for third and fourth years include: Biometrics

454, Chemistry 670, Genetics 451, Microbiology 360, Zoology 300. All course programs must be approved by the Department. Students are advised to have a reading knowledge of French and German. Attendance at the Departmental Seminar is required in the fourth year. Students may be required to take a comprehensive oral examination at the end of the fourth year.

For students already enrolled in Honors Biochemistry, the old program remains in force—

Third Year

Biochemistry 400, Chemistry 372, Physiology 361, an option (Zoology 300 recommended), an option from Division A or B.

Fourth Year

Chemistry 550; two of the following half-courses: Biochemistry 511, 531, 551, 571; two options. Attendance at the Departmental Seminar is required.

DEPARTMENT OF BOTANY

Honors in Botany

First Year

Botany 201, Chemistry 230, Zoology 220, Geology 201, an option from Division A or B, Physical Education.

Second Year

Two senior courses in Botany, Chemistry 350, Physics 100 or 200, an option from Division A or B.

Third Year

Two advanced courses in Botany, an option from Division A or B, two Division C options.

Fourth Year

Two advanced courses in Botany, Genetics 451, an option.

Options are to be selected in consultation with the department. Attention will be given to the requirements of those who intend to teach and of those who propose to undertake research in some branch of botanical science.

Honors students in botany are expected during the summer vacations to make themselves acquainted with the families of Canadian flowering plants. Honors students are invited to apply for summer assistantships.

DEPARTMENT OF CHEMISTRY

Honors in Chemistry

First Year

Chemistry 230, Chemistry 250 or 350, Mathematics 201, Physics 240, English 200 or 210, Physical Education.

Second Year

Chemistry 372, Chemistry 312, Mathematics 304, Physics 340, an option from Division A or B (*note*: if a language is started in this year, it must be continued in the third year).

Third and Fourth Years

The equivalent of ten full courses will be required. These must include German 210 or Russian 210, if not taken earlier; Mathematics 404; Chemistry

511, 531, 550, 551, 555, 575, 579, 581, 583, 585; and one other half course in Chemistry. Two open options are permitted.

In addition to the regular course examinations, candidates for honors may be given one or more oral or written examinations in the field of chemistry at the end of the fourth year.

Attendance in the Departmental Research Seminar, Chemistry 602, which meets once a week, is required in the fourth year.

NOTE: All options shall be selected after consultation with the Department.

DEPARTMENT OF CLASSICS

A statement will be found below of the general scheme of courses required to obtain honors in this department. It is not implied that this scheme must be rigidly followed; the department is prepared at any time to discuss with prospective or actual students reasonable equivalents designed to meet special needs or desires of the persons concerned. In the courses dealing with the literary history, the economic and political history, and the private life of the classical peoples, oral examinations may at any time replace written tests, and a comprehensive examination, written or oral as the department may determine, will be a necessary condition for attaining final honors.

Students who may desire an honors course in Latin and German, in Greek and French, in Greek and German, or in Greek and Philosophy, can obtain information and advice on application to the department.

Honors in Classics

First Year

Greek 100; Latin 200; Classical Survey Course 350 (Greek Classics) or Classical Survey Course 352 (Greek History); two approved options, one of which should be from the C Division; Physical Education.

Second Year

Greek 300; one senior Latin course; Classical Survey Course 354 (Ancient Art) or Classical Survey Course 356 (Early Civilization); Classical Survey Course 352 (Greek History) or Classical Survey Course 350 (Greek Classics); Classical Survey Course 351 (Latin Classics) or Classical Survey Course 353 (Roman History). An option approved by the department may be substituted for *one* of the survey courses listed above.

Third Year

One senior Greek course; one course in honors Greek; one course in honors Latin; either Classical Survey Course 354 (Ancient Art) or Classical Survey Course 353 (Roman History) or Classical Survey Course 351 (Latin Classics); either Classical Survey Course 354 (Ancient Art) or Classical Survey Course 356 (Early Civilization). An option approved by the department may be substituted for *one* of the survey courses listed above.

Fourth Year

Either Greek or Latin as a major, two courses; Latin or Greek as a minor, one course; one approved option; Latin or Greek Prose (one hour a week).

Honors in Classics, Ancient History and Archaeology

A program for honors with particular emphasis on Ancient History and Archaeology may be arranged by discussion with the department.

NOTE: Courses in Sanskrit, Comparative Philology, Comparative Syntax, Greek Dialects and Italic Dialects are also offered by the department and may be credited towards the M.A. degree.

Honors in Latin and French

First Year

Latin 200; a French course; Classical Survey Course 350 (Greek Classics); two approved options, one of which should be from the C Division; Physical Education.

Second Year

One Latin course; one French course; two options from Divisions A and B, of which one should preferably be Classical Survey Course 351 (Latin Classics), either in this year or the third year.

Third Year

One Latin course; one French course; two options from Divisions A and B; General Linguistics 400.

Fourth Year

Two Latin courses; one French course; one option from Divisions A and B; Latin Prose (one hour a week).

NOTE: Classical Survey Course 353 (Roman History) is recommended for selection in the options of the second, third and fourth years.

Honors in Latin and English

First Year

Latin 200; English 200; Classical Survey Course 351 (Latin Classics) *or* 353 (Roman History); two approved options, one of which should be from C Division; Physical Education.

Second Year

A senior course in Latin; Latin Prose (one hour a week); a senior course in English; Classical Survey Course 351 (Latin Classics) or 353 (Roman History); an option.

Third Year

A senior course in Latin; Latin Prose (one hour a week); a senior course in English; Classical Survey Course 350 (Greek Classics) *or* a second senior course in English; an option.

Fourth Year

Two senior courses in Latin; Latin Prose (one hour a week); a senior course in English; a second senior course in English *or* Classical Survey Course 350 (Greek Classics).

(For Honors in French and Latin, see under Department of Modern Languages.)

DEPARTMENT OF ENGLISH

Students wishing to read for Honors in English should consult the head of the department at the beginning of the first year. Their registration should be that of students in the first year of the English pattern.

Sudents deciding during or at the end of the first year to undertake honors in English must consult the head of the department at the earliest possible moment in order to ascertain whether their first-year courses and their standing in these courses are acceptable as a basis for admission to honors at the beginning of the second year; and in cases where the first-year courses do not seem to provide an adequate basis, to discuss what extra work should be taken to rectify the situation.

Second Year

Two senior English courses; continuation of a language studied in the first year; two options.

Third Year

Three senior English courses; two options. English 504 will be commenced in this year and continued throughout the fourth.

Fourth Year

Four courses, of which at least two shall be senior English courses. English 504 is to be continued and will count as a fifth course.

NOTE: Six of the senior English courses must be chosen to represent each of the following periods of literature: Middle English, Elizabethan, Seventeenth Century, Eighteenth Century, Romantic, Victorian. In addition, English 308 and English 504 will be required. At the discretion of the department, a student may take up to eleven senior English courses. All courses, including options, are to be chosen in consultation with the chairman of the department.

At the beginning of the third year students in Honors English will write an examination on the history of English literature. Texts will be recommended by the chairman of the department.

DEPARTMENT OF ENTOMOLOGY

Honors in Entomology

First Year

Physics 100 or 200, Botany 201, Zoology 220, Chemistry 230, English 200 or 210, Physical Education.

Second Year

Entomology 301; Zoology 350; Special A or B course; Chemistry 350; an option, one of the following recommended: a senior Zoology, Statistics 210 or 255, Geology 201 or 353, Botany 300 or 310 or 320.

Third Year

One of Entomology 414, 422, 456; Special A or B course; three options, the following recommended: Entomology 414, 422, 456, 475, a senior Zoology course, Geology 201 or 353, Botany 300 or 310 or 320, Genetics 451, Microbiology 360, Biochemistry 300.

Fourth Year

Entomology 422, 456 or 475; German 210 or another approved language; two

options. It is recommended that these be selected from among Entomology 523, 512 and the courses suggested for second and third year options.

DEPARTMENT OF GEOGRAPHY

The Department offers both the B.A. and the B.Sc. degrees with Honors in Geography. Students wishing to stress the humanities and social sciences should register in the B.A. program; those who wish to stress the physical and biological sciences should register in the B.Sc. Program.

B.A. with Honors in Geography

First Year

Geography 201, English 200, one junior course from Division B, one A or B option, one science or mathematics or statistics course, Physical Education.

Second Year

Geography 300; Geography 301; one of Geography 302, 401, or 403; two approved options.

Third Year

Geography 400; one of Geography 302, 401, 402, or 406; three approved senior options.

Fourth Year

Geography 502; one of Geography 404 or 408; three approved senior options.

Students are required to have a reading knowledge of French or German. At the end of the fourth year a candidate for honors will be required to take an oral or written examination in the field of geography.

B.Sc. with Honors in Geography

First Year

Geography 201; English 200 or 210; Geology 201; one of Botany 201, Zoology 220; one of Mathematics 200 or 201, Statistics 255, Physics 240, Chemistry 230; Physical Education.

Second Year

Geography 300; Geography 301; one of Geography 302, 401, or 403; two approved options from Division C.

Third Year

Geography 400; one of Geography 302, 401, 402, 406; one approved option from Divisions A or B; one approved option in Geology; one approved option from Division C.

Fourth Year

Geography 502; one of Geography 404 or 408; one approved option in Geology; one approved option from Division C; one approved option.

Students are required to have a reading knowledge of French or German. At the end of the fourth year a candidate for honors will be required to take an oral or written examination in the field of Geography.

DEPARTMENT OF PLANT SCIENCE

Honors in Genetics

The honors program in genetics is designed primarily to prepare students for advanced study towards higher degrees and research or academic careers. Genetic studies at the University of Alberta are actively pursued in a number of biological fields representing different departments, and courses in the honors program are offered by the departments concerned.

Students choosing the honors program in genetics are requested to meet the Head of the Department of Plant Science as early in the second year as possible in order to draw up the course program in detail.

First Year

Botany 201, Zoology 220, Chemistry 230, English 200 or 210, one of Mathematics 201 or 200.

Second Year

Genetics 451, Chemistry 350, Physics 100 or 200, one other approved course (Geology 201 or Botany 300 or Microbiology 360 or Zoology 300 recommended). One option from division A or B.

Third Year

Biometrics 453, Genetics 462, Biochemistry 300 or 350, Animal Science 465 and 466, special A or B option.

Fourth Year

Three courses in Genetics, including Genetics 530 and 532. The equivalent of one other advanced course in genetics; two options one from A or B. (Options to be selected in consultation with the Department of Plant Science.)

DEPARTMENT OF GEOLOGY

Honors in Geology

First Year

Recommended program: Geology 201, Chemistry 230; Physics 242, Mathematics 201; English 200 or 210; Physical Education.

Second Year

Geology 351; Geology 353; Botany 201 or Zoology 220; Mathematics 300 and Physics 320; one option from Division A or B.

Third Year

Geology 454; Geology 457; Geology 458 or Geology 461 *and* 464; Chemistry 312; one option.*

Fourth Year

Geology 455 and three or four options to be selected in consultation with the Department.*

Students are advised to have a reading knowledge of a modern language. At the end of the fourth year a candidate for honors will be required to take an oral or a written examination in the field of geology.

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*One of these options must be from the A or B Division and one should be a course in Geophysics.

Honors in Physics and Geology

See under Department of Physics.

DEPARTMENT OF HISTORY

Honors in History

Students proposing to read for Honors in History should consult the Head of the Department at the time of their first registration. Registration in the first year of Honors is similar to that in the History pattern, but should include a foreign language. Students who wish to enter Honors at the beginning of the second year should consult the Head of the Department.

The degree of Bachelor of Arts with Honors in History is awarded on the following basis:

(1) Comprehensive examinations written at the end of the fourth year in the following fields of historical study:
   1. North American history
   2. The history of Britain and the Commonwealth
   3. Europe before 1789
   4. Europe since 1789.

(2) Examinations, oral and written, at the end of the fourth year, in a special historical subject chosen by the student not later than the beginning of his third year. In connection with this he will be required to write a minor thesis utilizing primary source material.

(3) Satisfactory completion of approved courses in *two* other fields of study chosen in consultation with the Head of the Department, e.g. English, Philosophy, Political Science, a second language. At least two courses must be taken in each of the two fields chosen.

(4) Proof of ability to read a modern language other than English.

Students in the third and fourth years are expected to select most of their courses from among the Honors and Graduate courses offered by the Department. Normally, Honors students in History take five courses a year. They are expected to pursue a course of reading during the summers. This is arranged with the Department in connection with preparation for the comprehensive papers and the special subject. No final examinations are taken in history courses at the end of the fourth year when the comprehensive papers are written.

DEPARTMENT OF MATHEMATICS

Honors in Mathematics

First Year

Mathematics 201, Statistics 255 or Mathematics 270, Physics 242, one option from Division C, one option from Division A or B, Physical Education.

Second Year

Mathematics 306, Mathematics 310, Statistics 255 or Mathematics 270, one option from Division C, one option from Division A or B.

Third Year

Mathematics 421, 422, 425, one approved Mathematics option (preferably Mathematics 360), two options (at least one from another department).

Fourth Year

Mathematics 500, two approved Mathematics options, two options, one of which should be from Division A or B.

NOTES: The program must be approved by the Department of Mathematics. Students who hope to do graduate work in mathematics should select two of the open options in third and fourth year from Mathematics or Mathematical Physics.

The A or B options may include beginners' language courses such as German 210 or Russian 210.

Honors in Applied Mathematics

The B.Sc. degree with Honors in Applied Mathematics may be taken by students who wish to specialize in mechanics, including hydrodynamics, aerodynamics, elasticity and the theory of relativity.

First Year

As above.

Second Year

As above. The C option should preferably be Physics 380.

Third Year

Mathematics 421, 422, 425, 430; an approved Mathematics option, an approved Physics option (preferably Physics 480), an option from Physics or Mathematics.

Fourth Year

Mathematics 500, Physics 550, an option from Division A or B, two approved options from Mathematics or Physics (preferably from Mathematics 550, 555, 580, 635 or Physics 510, 516, 570).

NOTE: The program must be approved by the Department of Mathematics. The A or B options may include beginners' language courses such as German 210 and Russian 210.

DEPARTMENT OF MODERN LANGUAGES

The Department offers courses in French, German, Russian, Spanish, and Ukrainian. Many different programs are possible and students should consult the Department before choosing courses. In all cases departmental approval of the program chosen is required before registration.

Students may register in Honors in the first year, or may enter in the second year from the foreign language pattern.

Degrees with Honors from this Department will fall into two main groups:—

(1) Honors in Modern Languages and Literature,

(2) Honors in one modern language and an approved minor subject (as for example, Honors in French and English, Honors in French and Latin).

Programs in group (1) will require a maximum of eight courses in the language chosen as the major, four or five courses in the language chosen as the minor, and seven or eight options (one of which must be a Division C course in the first year), for a total of twenty courses. Some of the optional subjects will be integrated with the language program, while others should be general options.

These programs are recommended to students wishing to specialize in a foreign language in order to embrace an academic career, particularly to those intending to go on to post-graduate work. A reduction may be made in the number of courses in the major language by students preparing for other careers and in special cases. As a general rule, students entering with a normal matriculation will not be permitted a third modern language until they have laid a firm foundation in the first two.

Programs in group (2) will require eight courses in the major, four to six in the minor subject, and six to eight approved options, (one of which must be a division C course in the first year), for a total of twenty courses. Programs in this group will be arranged in consultation with both Departments concerned.

In addition to the courses listed here, all Honors students will take, in each year, such laboratory hours as may be deemed necessary to improve their oral proficiency.

Apart from the regular course examinations at the end of the fourth year, students may be required to take comprehensive oral examinations in the languages studied.

High School students intending to specialize in Modern Languages are advised to take as much Latin as they can in addition to their Modern Languages.

DEPARTMENT OF PHILOSOPHY AND SOCIOLOGY

Degrees with Honors from this Department will fall into these groups:

(1) B.A. with Honors in Philosophy and an approved minor subject;
(2) B.A. with Honors in Philosophy and Greek;
(3) B.A. with Honors in Sociology and approved minor subject;
(4) B.A. with Honors in Sociology and Psychology.

There are several possible programs within each of these groups, and more detailed information is available from the Department. Students are advised to consult the Department for information before choosing one of the groups, and in any case, Departmental approval of the final program of studies is required before registration. In the case of students under (2), the program will be arranged in consultation with the Department of Classics and the Department of Philosophy and Sociology, and in the case of (4) with the Department of Psychology.

Honors in Philosophy will require ten courses in Philosophy. Five or six in a minor subject, or an integrated selection of five or six courses in a group of subjects, will also be required; this part of the program will be closely related to the student's special interests within the field of philosophy. Four or five optional courses outside the fields of philosophy and the minor will complete the program.

Honors in Philosophy and Greek will follow the requirements of Honors in Philosophy, with some reduction in the number of Philosophy courses in order to increase the number of Greek courses beyond the requirements for a minor subject.

Honors in Sociology will reguire eight to ten courses in Sociology. Depending on the special interests of the students, five or six courses in a related minor subject will be taken. An additional five or six courses outside the field of Sociology and the minor area will be required to complete the program.

Honors in Sociology and Psychology will require seven courses in Sociology and seven in Psychology. In addition, six other courses will be required to complete the program.

In addition to final examinations in courses prescribed, students in the final year of all groups will be required to write two comprehensive examinations, one of which may take the form of an essay paper.

DEPARTMENT OF PHYSICS*

Honors in Physics

First Year

Physics 242, Mathematics 201, Mathematics 270, Chemistry 230, English 200 or 210, Physical Education.

First-year Engineering or the first year of the Physics pattern in the general course may be accepted in consultation with the department.

Second Year

Physics 360; Physics 380; Mathematics 306, a foreign language (German 210 or Russian 210 is recommended), an option from Division B.

Third Year

Physics 440; Physics 470; Physics 480; Mathematics 320; Mathematics 430 or an equivalent course; Mathematics 421 and 422.

Fourth Year

Physics 510; Physics 550; Physics 570; Physics 571 laboratory; three of Mathematics 500, Physics 516, Physics 520, Physics 540, Physics 572. Other options in the Fourth Year can be arranged in special cases.

Students are also expected to take part in the weekly Physics Colloquium.

At the end of the Fourth year there will be, in addition to the regular examinations in each lecture course, a written comprehensive examination on the work of the whole course.

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*NOTE: The B.Sc. in Engineering Physics—Students interested in the B.Sc. degree in Engineering Physics should consult with the Dean of the Faculty of Engineering.

Honors in Physics and Geology

First Year

Physics 242, Geology 201, Mathematics 201, Chemistry 230, English 200 or 210, Physical Education. (The first year of the Geology or Physics patterns may be accepted in consultation with the Department.)

Second Year

Physics 380; Geology 351; Mathematics 306; Chemistry 372; an A or B option.

Third Year

Physics 360; Geology 454; Geology 457; Mathematics 421 *and* 422; an A or B option.

Fourth Year

Physics 480; Physics 520; Physics 440 or Physics 470 *and* 471; two senior Geology courses, Geology 455 and 458 recommended.

DEPARTMENT OF PHYSIOLOGY

Honors in Physiology

The honors program is designed primarily to prepare students for advanced study and research leading to academic and research careers. The secondary purpose is to provide students with a specialized knowledge, both theoretical and practical, to prepare them for positions as research assistants in government, hospital and industrial laboratories. The emphasis has been placed on depth rather than breadth. Consideration will be given, in choice of options and reading material, to students with interest in a particular branch of Physiology or in Pharmacology.

First Year

Chemistry 230, Physics 100, 200 or 240, Zoology 220, Mathematics 200 or 201, English 200 or 210, Physical Education.

Second Year

Chemistry 350, Chemistry 370, Physiology 361, Zoology 300, a modern language (German 210 is suggested).

Third Year

Physiology 463, Biochemistry 300, Physiology 504 (half-course), Physiology 600 (Seminar), one option from Division A or B, one approved science option (Zoology 580 or Physics 340 or 380 recommended).

Fourth Year

One of Physiology 501, 502, 503 and 504; one of Biochemistry 511, 531, Physiology 505, 506 and 600; Preventive Medicine 421; one approved science option (Statistics 210, Bacteriology 360, Botany 320 and Pharmacology 421 recommended).

A reading knowledge of French and German is recommended.

A comprehensive oral examination may be required at the termination of the prescribed course.

DEPARTMENT OF POLITICAL ECONOMY

Honors in Economics

First Year

Economics 1, one course from Division A, one course from Division C, two options to be selected with the advice of the department, Physical Education.

Second Year

Two courses in Economics, Statistics 255, two options to be chosen in consultation with the department.

Third and Fourth Years

Before entering the third year each student will arrange, in consultation with the department, a program of study and lectures to prepare himself for final comprehensive examinations. Unless they have been taken in the First and Second Years, the following courses are required: Two courses in foreign languages, preferably French or German or Russian (either two courses in one language or one in each of two languages); Accounting 200; Mathematics 200 or 201.

Honors in Political Science

First Year

Political Science 200.
One course from Division A.
One course from Division C.
Two options to be chosen in consultation with the department.
Physical Education.

Second Year

Two courses in Political Science.
Three options to be chosen in consultation with the department.

Third and Fourth Years

Before entering the third year, each student will arrange, in consultation with the department, a program of study and lectures to prepare himself for final comprehensive examinations. Unless they have been taken in the First and Second Years, two courses in foreign languages, preferably French or German or Russian, are required. Students may take either two courses in one language or one in each of two languages.

DEPARTMENT OF PSYCHOLOGY

Degrees with Honors from this Department will fall into these groups:

(1) B.A. with Honors in Psychology and an approved minor subject.
(2) B.Sc. with Honors in Psychology and an approved minor subject from Division C.
(3) B.A. with Honors in Psychology and Sociology.

There are several possible programs within each of these groups and more detailed information is available from the Department. Students are advised to consult the Department for information before choosing one of the groups and Departmental approval of the final program of studies is required before registration. In the case of students under (3) the program will be arranged in consultation with the Department of Philosophy and Sociology.

Honors in Psychology will require eight to ten courses in Psychology. A minimum of four courses will be taken in a minor subject, which must be related to the subject-matter of psychology and to the student's special interests. A minimum of five optional subjects will also be chosen; some of these will be integrated with the program in psychology and in the minor, while others must be general options.

The B.A. will be awarded after successful completion of most programs for Honors in Psychology. Where the B.Sc. is sought, not only the minor but also some of the optional subjects will be chosen from Division C. The B.Sc. program is designed for students whose special interests are in Experimental Psychology or closely related fields.

Honors in Sociology and Psychology will require seven courses in Sociology and seven in Psychology. In addition, six other courses will be required to complete the program.

In addition to final examinations in courses prescribed, students in the final year of all groups will be required to write two comprehensive examinations, one of which may take the form of an essay paper.

SLAVONIC AND SOVIET STUDIES

Students wishing to undertake a program of Slavonic and Soviet studies should register for Honors in History, Modern Languages, Economics or Political Science, depending on the area of concentration desired. By choosing his options according to the course requirements set out by an interdepartmental committee, a student may qualify to have the notation "Slavonic and Soviet Studies" added to his record upon satisfactory completion of his whole program.

DEPARTMENT OF ZOOLOGY

Honors in Zoology

The Honors program of the Department of Zoology is designed primarily to provide a broad knowledge of biology in preparation for advanced study towards higher degrees and a research or academic career. To a limited extent the program can be fitted to individual needs. A final comprehensive examination will test the student's general knowledge of biological facts and principles.

Students choosing to enter the Honors program should make themselves known to the Department as early as possible during their first year of study. The Honors program must be drawn up in consultation with members of the Department.

Provision for summer employment of Honors students in biological work usually can be made. During their senior years it is expected that Honors students will assist as demonstrators in elementary laboratories.

First Year

Zoology 220, Botany 201, Chemistry 230, Mathematics 200 or 201, English 200 or 210, Physical Education.

Second Year

Zoology 300, Chemistry 350, Physics 100 or 200 or 240, Genetics 451, one option from Division A or B (French 200 recommended).

Third Year

Zoology 350, Zoology 525, a senior Zoology, Biochemistry 300, one approved option from Division C, an option (German 210 or Russian 210 recommended).

Fourth Year

Zoology 520, Zoology 525, three senior Zoology courses, an approved Division C option, an A or B option, a comprehensive examination.

GENERAL COURSE REGULATIONS

Attention is directed to the regulation in Part I of the Calendar that makes every student responsible for the completeness and accuracy of his registration. This regulation will be strictly enforced.

Students registering in a "100" foreign language (beginner's language) in the winter session will be required to take an intensive course of five hours per week instead of the usual three hours.

No candidate for the Bachelor's degree in the Faculty of Arts and Science will be recommended to the General Faculty Council for the award of the degree until three regular academic sessions, September to April, have elapsed from the date of registration in the first year.

Except by special permission of the Council of the Faculty, no student under its jurisdiction may offer for credit in any period of twelve months from September 1 to August 31 more than five courses either in the regular winter session from September to April or in both the winter and the summer session. Except by special permission of the Council of the Faculty, no student may take in the summer session more than two courses.

Normally, not more than two courses may be taken in any one department, or division of a department, in any given year and not more than five courses in any one department, or division thereof, during the three years of the general course. In special cases the Dean may permit a student to take three courses in one department, or division of a department, in the final year, making a total of six courses in the same department or division thereof. (The divisions referred to in this paragraph are those which exist in the Departments of Classics, Fine Arts, Modern Languages, Political Economy, and Philosophy and Sociology: for example: Department of Fine Arts, Drama Division.)

Students proceeding to a Bachelor's degree in the Faculty of Arts and Science will be required to attend at least one regular academic session, September to April. Exceptions may be made to this rule in the cases of teachers who have had at least two years' experience subsequent to receiving their permanent certificates. Such students may meet the requirements for the degree of Bachelor of Arts or Bachelor of Science by attendance at summer sessions only. They are warned that the University cannot undertake to offer in summer sessions all the courses which may be desired for the B.A. degree or required for the B.Sc. degree.

Of the courses taken for the B.A. or B.Sc., students must obtain second-class standing, i.e. a mark of 65%, in no fewer than *six* courses, of which at least *four* are taken in the second and third years.

Students who expect to transfer to the Faculty of Medicine from the Faculty of Arts and Science should register in one of the patterns for the B.A. or B.Sc. The requirements for admission to the Faculty of Medicine are at least two years of university training, with appropriate standing, and credit in Chemistry 230 and 350, Physics 100, 200 or 240, and Zoology 220. These qualifications can be obtained, by proper choice of courses, in the first two years of the Botany, Chemistry, Entomology, Experimental Psychology, General Science, Mathematics, Physics, or Zoology patterns. The same qualifications can be obtained in three years in any pattern for the B.A.

Any student who at the normal time of graduation lacks the requisite number of second-class standings may apply for a supplemental examination for the purpose of raising a previous mark in any subject of senior grade previously passed other than one in which pass standing was secured by a supplemental examination. Only one such supplemental examination may be granted in any subject.

Students entering theology in St. Stephen's College may be exempted from two senior courses selected from Division A or B by presenting evidence that they have completed equivalent courses in the college.

Roman Catholic students in St. Joseph's College may be exempted from one senior course in Division B on presentation of a certificate from the college showing that they have satisfactorily completed the course in religious knowledge designated Christian Apologetics 366 as given in St. Joseph's College. Further, such students may

substitute Philosophy 246 as given in the College for Philosophy 240 and Philosophy 356 as given in the College for a senior course in Philosophy.

Students who have successfully completed two years of a B.Sc. pattern and two years of Medicine may qualify for the B.Sc. by completing the requirements of the pattern chosen. Certain courses in Medicine may be equated with certain science courses given in the Faculty of Arts and Science.

The term "option", where it appears in the patterns, should be construed as a course freely chosen by the student, provided that he has the necessary prerequisites or corequisites. An "approved option" should be construed as an option approved by the department directing the program of the student concerned.

REQUIREMENTS FOR B.A. AND B.SC. AFTER B.ED.

Students who have qualified for the degree of B.Ed. may proceed to the degree of B.A. or B.Sc. If they have met the matriculation requirements of the Faculty of Arts and Science and have completed *thirteen* Arts and Science courses, they will be required to complete at least *six* senior courses in the Faculty of Arts and Science with at least second class standing in four of these courses. Students with incomplete matriculation for Arts and Science will be required either to remove these deficiencies or to secure credit in University courses of an equivalent standard. Students who have credit in fewer than thirteen Arts and Science courses may be required to complete additional courses. Students proposing to secure the B.A. or B.Sc in this manner will be expected to select their subjects in conformity with one of the standard Arts and Science patterns and are advised to consult the Dean of the Faculty of Arts and Science about their programs.

REQUIREMENTS FOR B.A. AFTER B.SC., AND B.SC. AFTER B.A.

Students who have qualified for the degree of B.A. may proceed to the degree of B.Sc in this Faculty; those who have qualified for the B.Sc. in this Faculty may proceed to the B.A. Students proposing to secure the B.A. or B.Sc. in this manner will be required to complete a 9-course program conforming to one of the standard Arts and Science patterns, with at least second class standing in five of these courses. Students with incomplete matriculation for the second degree will be required either to remove the deficiencies or to secure credit in University courses of an equivalent standard.

B.A. PATTERNS

NOTE: B.A. students must select three C Division courses which must include at least one biological science and one physical science or mathematics. A student may not include Biology 341 and Botany 201 or Zoology 220 in his program, nor may he include more than one of Physical Science 341 and Physics 100 or 200.

Students taking a foreign language in the University will normally continue to study the language of matriculation.

Students planning to enter theology may elect Greek 100 as the foreign language of any pattern.

The Division C courses for the *First Year* should be one of:

> Astronomy 253, Botany 201, Zoology 220, Chemistry 130, Chemistry 230, Physics 100, Physics 200, Mathematics 200 or 201 or 260, Geology 201, Geography 201, Statistics 210 or 255.

For the *Second Year*:

any of the above *or* a second course in which the first year choice was taken, or Biology 341 or Physical Science 341 or Genetics 451 or Microbiology 360 or Entomology 301.

For the *Third Year*:

any of the above or Biochemistry 300 or Physiology 361.

Division A

(English, Foreign Languages, Art, Drama, Music)

English

First Year

English 200

French 200 or Latin 200 or German 200, or, with permission, another language.

History 200.

A second foreign language or a junior course from Division B.

A science or mathematics or statistics course.

Physical Education.

Second Year

A science or mathematics or statistics course.

Two senior courses from Division B not in the same department *or* one senior course from Division B and one senior Foreign Language.

Two senior English courses.

Third Year

A science or mathematics or statistics course.

A senior course from Division A or B.

An option.

Two senior English courses.

Foreign Languages

(The Foreign Language patterns are generally based on two foreign languages, with the language of matriculation serving as the core.)

First Year

The foreign language of matriculation.

A second foreign language.

In special cases, permission may be given to take two of French 100, Latin 100, German 100, Greek 100, Russian 100, Spanish 100, but if such a choice is made, the student will be required, in *addition* to the courses listed below, to take a *third* senior foreign language course.

English 200.

One junior course from Division B.

A science or mathematics or statistics course.

Physical Education.

Second Year

Two foreign language courses (in languages taken in the first year).

A senior course from Division A (not a foreign language).

A senior course from Division B.
A science or mathematics or statistics course.

Third Year

Two foreign language courses (in languages taken in the second year).
A senior course from Division A or B.
An option.
A science or mathematics or statistics course.

Art

First Year

Art 240 or 250.
English 200.
French 200 or Latin 200 or German 200, or, with permission, another language.
History 200.
A science or mathematics or statistics course.
Physical Education.

Second Year

Art 300.
Art 250 or 330 or 340.
A senior course from Division A or B.
An approved option.
A science or mathematics or statistics course.

Third Year

Art 400.
Art 250 or 330 or 340 or 350.
A senior course from Division A or B.
An option.
A science or mathematics or statistics course.

Drama

First Year

Drama 250.
English 200.
French 200 or Latin 200 or German 200, or, with permission, another language.
History 200 or another B option.
A science or mathematics or statistics course.
Physical Education.

Second Year

Drama 350 or 450.
One of Drama 300, 360, 400.
English 332.
An approved option.
A science or mathematics or statistics course.

Third Year

Drama 450 or 350.
One of Drama 300, 360, 400.

An approved A or B option.
An option.
A science or mathematics or statistics course.

Music

First Year

Music 200.
English 200.
French 200 or Latin 200 or German 200, or, with permission, another language.
History 200.
A science or mathematics or statistics course.
Physical Education.

Second Year

Music 250.
Music 300.
Music 301.
A senior course from Division A or B.
An approved option.
A science or mathematics or statistics course.

Third Year

Music 350.
Music 400.
Music 401.
A senior course from Division A or B.
An open option.
A science or mathematics or statistics course.

Division B Courses

(Economics, Geography, History, Mathematics, Political Science, Philosophy, Sociology, Psychology)

Economics

First Year

Economics 200.
English 200.
A junior course from Division B.
An A or B option.
A science or mathematics or statistics course or Accounting 200.
Physical Education.

Second Year

Economics 300.
An approved senior Economics course (preferably Economics 340).
Two approved options, one of which may be a Political Science course.
A science or mathematics or statistics course or Accounting 200.

Third Year

Two approved senior courses in Economics (one of these must be Economics 340 if it was not taken in the second year).

An approved option, which may be a Political Science course
An option.
A science or mathematics or statistics course or Accounting 200.

Geography

First Year

Geography 201.
English 200.
A junior course from Division B.
An A or B option.
A science or mathematics or statistics course.
Physical Education.

Second Year

Geography 300.
Geography 301.
An approved B option.
An approved A or B option.
A science or mathematics or statistics course.

Third Year

Geography 400.
Geography 302, 402, 404, or 401.
An approved B option.
An option.
A science or mathematics or statistics course.

History

First Year

History 200 or 210.
English 200.
A junior course from Division B.
An A or B option.
A science or mathematics or statistics course.
Physical Education.

Second Year

Two senior History courses.
Two approved options.
A science or mathematics or statistics course.

Third Year

Two senior History courses.
An approved option.
An option.
A science or mathematics or statistics course.

Mathematics

First Year

Mathematics 200 or 201.
Mathematics 250 or 270 or Statistics 255.

English 200.
Two options from other departments.

Second Year

Mathematics 304.
Mathematics 250 or 270 or 310 or Statistics 255.
Three options from other departments.

Third Year

Mathematics 350 or 360 or 406 or Statistics 450.
Four options.
NOTE: One option must be a biological science.

Political Science

First Year

Political Science 200.
English 200.
A junior course from Division B.
A junior course from Division A or B.
A science or mathematics or statistics course.
Physical Education.

Second Year

Two approved courses in Political Science.
Two approved options, one of which may be an Economics course.
A science or mathematics or statistics course.

Third Year

Two approved Political Science courses.
An option.
An approved option, which may be an Economics course
A science or mathematics or statistics course.

Philosophy

First Year

Philosophy 240.
English 200.
An option from Division B.
An option from Division A or B.
A science or mathematics or statistics course.
Physical Education.

Second Year

Philosophy course.
A Psychology or Sociology course.
An option from Division A.
An option from Division A or B.
A science or mathematics or statistics course.

Third Year

Two senior courses in Philosophy or one senior course in Philosophy, and one in Psychology or Sociology.

An option.
A senior option from Division B.
A science or mathematics or statistics course.

Psychology

First Year

Psychology 202.
English 200.
An option from Division B.
French 200 or Latin 200 or German 200 or a Division B option.
A science or mathematics or statistics course.
Physical Education.

Second Year

A Psychology course.
A Philosophy course or a Sociology course.
An option from Division B.
An option from Division A or B.
A science or mathematics or statistics course.

Third Year

Two senior courses in Psychology, or one senior course in Psychology, and one in Philosophy or Sociology.
An option.
A senior option from Division B.
A science or mathematics or statistics course.

Sociology

First Year

Sociology 202.
English 200.
Psychology 202
A junior option from Division B or a language option.
A science or mathematics or statistics course.
Physical Education.

Second Year

A Sociology course.
Sociology 340 or Philosophy 352.
An option from Division A or B.
An option from Division B.
A science or mathematics or statistics course.

Third Year

Sociology 450 or 460.
Sociology 340 or Philosophy 352, or an approved option.
A senior option from Division B.
An option.
A science or mathematics or statistics course.

B.Sc. PATTERNS

NOTE: In the first year of the B.Sc. patterns, the foreign language of matriculation may be substituted for English 210, provided English 210 is taken in the second year.

Special A or B Courses for B.Sc. Students

In the second and third years, students are required to select one from the following list:

Classics 352, 353 or 356.
Classics 350 or 351 or Classics 354.
Economics 310 or 330.
Any senior English course.
Any senior course in Fine Arts.
Any Foreign Language course other than a beginning course.
Geography 300, 302, 400, 402, 404.
Any senior History course.
Old and New Testament Literature.
Philosophy 240, 260, 350, 352, 354, 360.
Any senior Political Science course.
Psychology 202, 320, 342.
Any Sociology course.

Written permission from the Dean's office must be obtained for registration in any courses not listed above.

Physical Sciences

(Chemistry, Geography, Geology, Mathematics, Physics)

Chemistry

First Year

Chemistry 230.
Mathematics 201.
Physics 240.
One of Botany 201, Zoology 220, Geology 201, Geography 201.
English 200 or 210.
Physical Education.

Second Year

Chemistry 350 and Chemistry 370 or 372.
Mathematics 304.
One of Botany 201, Geology 201, Zoology 220, Physics 340.
Special A or B course.

Third Year

Chemistry 312.
Physics 340, if not already taken, or one of Botany 201, Geology 201, Zoology 220.
Special A or B course.
An option.
An approved C option.

Geography

First Year

Geography 201.
English 200 or 210.
Geology 201.
One of Botany 201, Zoology 220.

One of Mathematics 200 or 201, Statistics 255, Physics 200, Chemistry 230.
Physical Education.

Second Year

Geography 300.
Geography 301.
An approved option in Geology.
An approved option in Botany or Zoology.
An approved option in Mathematics or Physics or Chemistry or Statistics.

Third Year

Geography 400.
Geography 302, 401, 402, 404.
Special A or B course.
An option.
An approved Division C option.

Geology

First Year

Geology 201.
Chemistry 230.
Mathematics 201.
Physics 240.
English 200 or 210.
Physical Education.

Second Year

Geology 351 and 353.
Special A or B course.
One of Botany 201 or Zoology 220.
Mathematics 300 and Physics 320.

Third Year

Two of Geology 454, 457, 458 (or 461 *and* 464).
Geology 467.
Special A or B course.
An option.
Chemistry 370.

Mathematics

First Year

Mathematics 201.
Mathematics 250 or 270 or Statistics 255.
Chemistry 230 or Physics 240.
An option from Division C.
English 200 or 210.
Physical Education.

Second Year

Mathematics 304.
Mathematics 250 or 270 or 310 or Statistics 255.
Special A or B course.
Two options, at least one from Division C.

Third Year

An approved senior Mathematics course (such as Mathematics 350, 360, 420, 430, 440, or Statistics 450).
Special A or B course.
Three options, at least one from Division C.

Physics

First Year

Physics 240.
Chemistry 230.
Mathematics 201.
One of Botany 201, Zoology 220, Geology 201, Geography 201.
English 200 or 210.
Physical Education.

Second Year

Physics 360, Physics 380, Mathematics 304.
An approved option from Division C.
Special A or B course.

Third Year

Two of Physics 400, 440, 520, or other approved senior Physics course, or Astronomy 410, or Chemistry 370.
Mathematics 404 or 421 *and* 422.
Special A or B course.
An option.

Biological Sciences

(Botany, Entomology, Experimental Psychology, Zoology)

Botany

First Year

Botany 201.
Zoology 220.
Geology 201 or Geography 201.
Chemistry 230.
English 200 or 210.
Physical Education.

Second Year

Botany 300.
Botany 310 or 330.
Special A or B course.
Chemistry 350.
Physics 100 or 200.

Third Year

Botany 310, 330 or 340.
Botany 320.
Special A or B course.

An option.
An approved Division C option.

Entomology

First Year

Physics 100 or 200.
Botany 201.
Zoology 220.
Chemistry 230.
English 200 or 210.
Physical Education.

Second Year

Entomology 301.
Zoology 350.
Special A or B course.
Chemistry 350.
An option, one of the following recommended: a senior Zoology course, Statistics 210 or 255, Geology 201 or 353, Botany 300 or 310 or 320, Genetics 451.

Third Year

One of Entomology 414, 422 or 456.
Special A or B course.
Three options, the following suggested: Entomology 414, 422, 456 or 475; a senior Zoology course; Geology 201 or 353; Botany 300, 310 or 320; Genetics 451; Microbiology 360; Biochemistry 300.

Experimental Psychology

First Year

Psychology 202.
Two of: a Chemistry course, a Mathematics course, a Physics course.
Zoology 220.
English 200 or 210.
Physical Education.

Second Year

Statistics 210.
A Philosophy or Sociology course or Psychology 320, 340, 342, or 382.
Two approved options from Division C.
One approved option in Botany, Entomology, Genetics, Physiology or Zoology.

Third Year

Psychology 460.
Psychology 320 or 340 or 342 or 382 or 430 or 488 or an approved A or B Division option.
An approved course in Biochemistry, Botany, Entomology, Genetics, Physiology or Zoology.
An option.
An approved senior option from Division C.

Zoology

First Year

Zoology 220.
Botany 201.
Mathematics 200 or 201.
Chemistry 230.
English 200 or 210.
Physical Education.

Second Year

Zoology 300 or 350.
Chemistry 350.
Physics 100 or 200.
An A or B option.
An approved C Division option.

Third Year

Zoology 300 or 350.
Another senior Zoology course.
An A or B option.
An approved Division C option.
An option.

General Science

First Year

Chemistry 230.
Physics 100 or 200 or 240.
Mathematics 200 or 201 or Statistics 210.
Botany 201 or Zoology 220.
English 200 or 210.
Physical Education.

Second Year

One senior course in each of two C Division subjects begun in the first year.
Two approved C Division options.
Special A or B course.

Third Year

A third course in one of the subjects of concentration followed in the first and second years.
Two senior C Division options.
An option.
Special A or B course.

Special B.Sc. Course

(Formerly the Special Biological Pattern)

This course is designed for the training of men and women who wish to fit themselves for positions in public health and clinical laboratories.

First Year

English 200 or 210.
Zoology 220.

Chemistry 230.
Chemistry 250.
Physics 100 or 200.
Physical Education.

Second Year

Special A or B course.
Physiology 361.
Chemistry 312.
Biochemistry 300.
Bacteriology 201.

Third Year

Special A or B course.
An approved C option.
An option.
Biochemistry 400.
Bacteriology 361.
Clinical Pathology 361.

Some hospitals in this province are prepared to accept graduates of this course for a one-year rotating apprenticeship leading to the registered technologist's examination.

COMBINED COURSES

Combined Course Leading to the Degrees of B.A. and B.Com.

Those interested in the combined course leading to the degree of B.A. and B.Com. are advised to consult the calendar of the School of Commerce.

Combined Course Leading to the Degrees of B.A. and B.Sc. in Engineering

A student may not enter this combined course (a) unless he has obtained an average of at least 65% in senior matriculation and (b) until his registration has been approved by the Dean of the Faculty of Engineering.

First Year

English 200 or 210; French 200 or German 200; Mathematics 200 or 201; a course from Division B; Chemistry 230; Physical Education.

If the course from Division B be Economics 200, Economics 302a or 302b shall not be taken when prescribed for students of Engineering, and another Division B course must then be substituted.

Second Year

A student may not enter the second year of this combined course unless he has completed the first year with an average of at least 65%.

One course from Division A; one course from Division B; a further course from Division A or B; *one* of: Mathematics 250 or 253, Statistics 255, Chemistry 350; Physics 238; C.E. 159, C.E. 150 and 151.

A student who takes Chemistry 350 at this stage and later enters Chemical

Engineering will be required to substitute another senior Course for Chemistry 350 in the second year of Chemical Engineering.

Third Year

One course from Division A; one course from Division B; a further course from Division A or B in the division already selected in the second year; Engineering Mechanics 150; Graphics 150.

The B.A. degree may be granted at the end of the third year to a student who has satisfactorily completed the above prescription and has satisfied the requirements of the Faculty of Arts and Science concerning second-class standing.

Fourth, Fifth and Sixth Years

As for the second, third, and fourth years in Engineering. Students intending to enter civil or mining engineering are required to spend at least one summer on practical survey work in the field prior to entering the fourth year of the combined course.

Combined Course Leading to the Degrees of B.A. and LL.B.

First Year

English 200; Latin 200 or French 200 or German 200; History 210; Economics 200 or Political Science 200 or Philosophy 240; a science or a mathematics or statistics course; Physical Education.

Second Year

No student may enter the second year of the combined course unless he has successfully completed the first year with an average of not less than 60%

Five areas of concentration are allowed:

1. Two of Economics 310, 330, 340, 350 or 370.
   History 350.
   A senior English course or a senior language.
   An approved B or C option.
2. Two of Political Science 310, 320, 330, 350.
   History 350.
   A senior English course or a senior language.
   An approved B or C option.
3. History 350.
   An approved senior History course.
   An approved senior Economics or Political Science course.
   A senior English course or a senior language.
   An approved B or C option.
4. Two approved senior English courses.
   History 350.
   An approved senior Economics or Political Science course.
   An approved B or C option or a senior language.
5. Two approved senior Philosophy courses.
   History 350.
   A senior English course or a senior language.
   An approved B or C option.

Third Year

History 450 and the prescription for first-year law.

Fourth Year

The prescription for second-year Law. The degree of B.A. may be granted at the end of the fourth year.

Fifth Year

The prescription for third-year Law.

Promotion from the second to the third year in the combined course is contingent upon an average of at least 60% in the second year and second class standing in at least four courses, two of which must be in the second year.

The Degree of Bachelor of Music (B.Mus.)

First Year

Music 200—History of Music, Choral Technique, and Conducting.
Music 203—An instrumental class in the principles and practice of Woodwind instruments.
Music 250—Ear Training and Keyboard Harmony, Harmony and Counterpoint, Form and Analysis.
English 200.
Practical First Subject—(Grade IX, Western Board of Music).
Practical Second Subject—Chorus; Orchestra.
Physical Education.

Second Year

Music 300—History of Music.
Music 303—An Instrumental Class in the Principles and Practice of Stringed Instruments.
Music 350—Ear Training and Keyboard Harmony, Harmony and Counterpoint.
Music 353—A class in orchestration.
An Arts and Science course.
Practical First Subject—(Grade X, Western Board of Music).
Practical Second Subject—Chorus; Orchestra.

Third Year

Music 400—History of Music.
Music 403—An instrumental class in the principles and practice of brass instruments.
Music 450—Ear Training and Keyboard Harmony, Harmony, Counterpoint.
Music 453—An advanced course in orchestration.
Two Arts and Science courses.
Practical First Subject—(Grade XI, A.Mus., Western Board of Music).
Practical Second Subject—(Grade VII, Western Board of Music); Chorus; Orchestra.

NOTE (1) In the above schedule, the B.Mus. degree will be accepted as equivalent to the B.A. degree, provided that the holder of the B.Mus. presents at least four Arts and Science courses from outside the Department of Fine Arts, two of which must

be senior courses and one of which must be a sequent to a junior course. In arranging their B.Ed. program, holders of the B.Mus. will be required to take two approved senior Arts and Science courses as options (8) and (9).

NOTE (11) *First Practical Subject*

Students entering the B.Mus. program without the Associate of Music (A.Mus.) Diploma of the Western Board of Music, must complete the requirements for this Diploma before graduation. Those who complete the requirements for the A.Mus. Diploma in the first year will be required, *either* to complete *two* of Music 503, 513, and 523 before graduation, *or* to proceed to the Licentiate of Music (L.Mus.) Diploma.

Those who complete the requirements for the A.Mus. Diploma in their second year will be required to complete one of Music 503, 513, and 523, in their third year.

Students entering the B.Mus. program with the A.Mus. Diploma of the Western Board of Music will be required, *either* to continue study within the Music Division towards the Licentiate of Music (L.Mus.) Diploma, *or* to complete Music 503 in their first year, Music 513 in their second, and Music 523 in their third.

Students entering the B.Mus. program with an Associate in Music Diploma from another recognized institution must complete the A.Mus. Diploma program of the Western Board of Music before graduation.

All students in the B.Mus. program are required to sit for an examination in the First and Second Practical Subjects in December and April of each year.

Diploma Program in Art

Entrance requirements are the same as for the B.A. program. Prospective students should also be prepared to submit at least *six* original works in anv choice of media.

Upon successful completion of the entire four-year program, the Diploma in Art will be conferred. It will contain a statement of one of the following areas of emphasis: (1) Painting, (2) Mural Painting and Decorative Painting, (3) Design and Illustration.

An intermediate diploma will be awarded to students who have successfully completed the first two years of the program.

First Year

(1) Principles of Design and Composition ..... Art 230
(2) Fundamentals of Drawing ..... Art 240
(3) Fundamentals of Painting ..... Art 250
(4) Theory of Color ..... Art 255
(5) Drawing from Memory and Knowledge ..... Art 260
(6) Anatomy ..... Art 265

Second Year

(1) Pictorial Composition ..... Art 330
(2) Advanced Drawing ..... Art 340
(3) Life Painting ..... Art 350
(4) Theory of Color ..... Art 355
(5) Still Life ..... Art 360
(6) Art History and Appreciation—Survey of Art from the Primitive Period to the Renaissance ..... Art 300

Third Year

*(1) Composition and Painting Techniques ..... Art 430
*(2) Life Drawing ..... Art 440
(3) Advanced Painting ..... Art 450
(4) Illustration and Book Decoration ..... Art 466
(5) Mural and Decorative Painting ..... Art 467
*(6) History and Appreciation—Survey of Art in Europe from the Renaissance to Modern Times ..... Art 400
(7) Landscape Painting—Banff School (Summer Session) ..... Art 468

*Compulsory; in addition, two other courses are to be selected.

Fourth Year

*(1) Pictorial Composition ..... Art 473
*(2) Life Drawing ..... Art 474
(3) Life Painting ..... Art 470
(4) Illustration and Book Decoration ..... Art 476
(5) Mural Painting and Decorative Painting ..... Art 477
*(6) Techniques ..... Art 475
(7) Landscape Painting—Banff School (Summer Session) ..... Art 478

*Compulsory; in addition, one other course is to be selected.

GRADUATE STUDIES

Students wishing to pursue work towards the Master's or Doctor's degree should consult the calendar of the Faculty of Graduate Studies.

DETAILS OF COURSES

NOTE: The hours of instruction for both terms of the winter session are shown at the top of each course description. The letter "L" attached to a figure signifies lecture-laboratory-hours, and the letter "s" seminar-hours. The symbol 3/2 means three hours in alternate weeks. Unless otherwise specified, the first figure in each term indicates lecture-hours and the second laboratory-hours.

The University reserves the right to modify or withdraw for the session any of the courses here outlined.

Regular attendance is expected of students in all courses.

N.B.—Course numbers were changed in 1959. The number in brackets is in each case the old number.

ACCOUNTING

Instruction offered by members of the Department of Accounting in the School of Commerce.

200. (1) Elementary Accounting (3-2; 3-2)

This course is designed to present the language of accounting to the student. The course is devoted to the mechanics of accounts and their application to specific conditions which arise in the business world. Attention is directed to the characteristics of the various forms of business organizations and the accounting implications from the standpoint of legal as well as managerial requirements.

An introductory presentation is made of the principles of auditing and internal control.

The principles of valuation as applied to inventories, fixed assets, and accounts receivable are considered.

The topic of financial statement analysis is introduced.

ART

See under Fine Arts

ASTRONOMY

Instruction offered by members of the Departments of Mathematics and Physics.

253. (formerly Mathematics 253) Astronomy (3-0; 3-0)

E. Phibbs

History of early astronomy, study of the earth, astronomical coordinates, time. The solar system, the stars, structure of the universe, origin of the solar system. Practical work; study of the constellations; discussion of articles in current journals.

Prerequisite: Mathematics 30 of high school. Some knowledge of Trigonometry is required and students are advised also to have credit in Math. 31 of high school.

Textbook: Baker, *Astronomy* (Van Nostrand).

This course is offered in regular sessions and summer sessions alternately.

410. (formerly Physics 410) Astrophysics (3-0; 3-0)

H. Grayson-Smith

Stellar spectra and their interpretation, theories of stellar constitution, cosmological theories, spectroscopy of the planets and theories of the solar system, terrestrial magnetism, structure of the earth, radio-astronomy and other modern advances.

Prerequisites: A University course in Physics, Mathematics 1 or 2 or 5 or 200 or 201.

Textbook: Payne-Goposchkin, *Introduction to Astronomy*.

Reference book: Aller, *Astrophysics*.

BACTERIOLOGY

Instruction offered by members of the Department of Bacteriology in the Faculty of Medicine.

Bacteriology

201. (1) Elementary Bateriology (2-3; 0-0)

Members of the Department

Simple general bacteriology; the importance of bacteria in everyday life. Demonstrations and practical laboratory exercises.

361. (61) Pathogenic Bacteriology (3-3; 3-3)

R. D. Stuart, S. R. Toshach and Members of the Department

The relation of bacteria, viruses, fungi and protozoa to disease. The isolation and identification of bacteria pathogenic to man. A study of bacterial infections and of resistance and immunity. Some consideration will be given to comparative bacteriology.

Textbooks: Whitby and Hynes, Burrows.
Prerequisites: Microbiology 60 or 360 or Bacteriology 1 or 201.

Microbiology

360. (60) Microbiology **(3-3; 3-3)**

G. E. Myers and J. W. Carmichael

A course in general microbiology including classification, physiology and metabolism, serving as an introduction to the practical application of this knowledge to industrial processes, specific fields of animal and plant biology and public health. The laboratory course illustrates the basic methods of studying micro-organisms and their products, and introduces the principles of the application of this knowledge.
Prerequisites: Chemistry 1 or 130 or 230 and Botany 1a, 1b, or 201 or Zoology 1 or 220.
Textbook: Stanier, Doudoroff, Adelberg, *The Microbial World,* or Pelczar, Reid, *Microbiology.*

Graduate Course—

501. (101) Microbiology

Members of the Department

A general reading course. This course is required of all students for higher degrees in bacteriology and will be carried out under departmental guidance. Students will be provided with a list of books, reprints, and references to important articles and suggestions on the selection of current literature. They will be required to submit abstracts or reviews of this material and to satisfy the department on their knowledge of it. Credit to a maximum of six hours.

BIOCHEMISTRY

Instruction offered by members of the Department of Biochemistry in the Faculty of Medicine.

300. (50) General Course **(3-3; 3-3)**

H. B. Collier, C. M. Kay and Mary S. Spencer

Open to students in Arts and Science with the prerequisites Chemistry 35 or 40 or 230 and 39 or 250 or 42 or 350.
The topics dealt with include: physico-chemical properties of protoplasm; chemistry of carbohydrates, lipids, proteins; enzymes; the physiological chemistry of digestion, respiration, excretion, intermediary metabolism, hormones, and nutrition.
Texts: Cantarow and Schepartz, *Biochemistry;* Harrow and Mazur, *Textbook of Biochemistry;* West and Todd, *Textbook of Biochemistry;* White, Handler, Smith and Stetten, *Principles of Biochemistry.*

350. (71) Plant Biochemistry **(3-3; 3-3)**

Mary S. Spencer

This course is designed as an introduction to plant biochemistry. Topics dealt with include the physicochemical properties of protoplasm; the chemistry and metabolism of carbohydrates, lipids, proteins, and related plant constituents; photosynthesis and plant growth.
Prerequisites: Chemistry 35 or 40 or 230 or 43, Chemistry 42 or 350.

400. (60) Clinical Biochemistry **(2-3; 2-3)**

H. B. Collier and E. T. Pritchard

Open to some students in Arts and Science with prerequisite Biochemistry 50 or 300. The topics dealt with in lectures and laboratory include: principles and use of instruments in clinical laboratories; acid-base and electrolyte metabolism; clinical chemistry of urine and blood; gastric analysis and various functional tests.

Text: Varley, *Practical Clinical Biochemistry.*

Reference texts: Hawk, Oser, and Summerson, *Practical Physiological Chemistry;* Bodansky and Bodansky, *Biochemistry of Disease;* Cantarow and Trumper, *Clinical Biochemistry;* Stewart and Dunlop, *Clinical Chemistry in Practical Medicine.*

Honor and Graduate Courses—

501. Advanced Laboratory **(0-3; 0-3)**

Staff

A laboratory course to accompany the graduate lecture courses offered to fourth year Honors and to graduate students. The emphasis will be on standard methods and techniques as applied to biochemical research. The actual course content may depend upon the lecture courses selected and the interests of the students.

Prerequisite: Biochemistry 300 or 350.

Reference texts will include: Cogwill and Pardee, *Experiments in Biochemical Research Techniques;* Umbreit, *Manometric Techniques;* Strong, *Biochemical Techniques: A Laboratory Manual.*

511. (101) Enzymology **(3-3; 0-0)**

J. Tuba

The nature and cellular location of enzymes and coenzymes; kinetics of enzyme action; oxidation-reduction systems of living cells; the relationship of enzymes to the metabolism of carbohydrates, fats, and proteins; phosphorus metabolism and the utilization of phosphate-bond energy in biological systems.

Prerequisite: Biochemistry 50 or 300.

531. (103) Chemistry of Proteins **(0-0; 3-0) or (3-0; 0-0)**

L. B. Smillie and C. M. Kay

A lecture course on topics in protein chemistry, including the following: isolation and solubility; electrochemical properties; size shape, and hydration; internal structure; relation of structure to function; nucleic acid structure; biosynthesis of proteins.

Prerequisites: Biochemistry 50 or 300 or 71 or 350, Chemistry 54 or 372.

541. Biochemistry of Lipids **(3-0; 0-0) or (0-0; 3-0)**

E. T. Pritchard

The structure, metabolism, and functions of lipids will be discussed. The emphasis will be on mammalian lipid metabolism.

Prerequisite: Biochemistry 300 or 350.

551. Advanced Plant Biochemistry (3-0; 0-0) or (0-0; 3-0)

MARY S. SPENCER

Selected topics in plant metabolism, with emphasis on the comparative biochemistry of respiration and carbon assimilation. Evaluation of recent research and of methods of investigation in these fields.

Prerequisites: Biochemistry 71 or 350 or 50 or 300.

561. (106) Chemistry of the Erythrocyte (3-0; 0-0) or (0-0; 3-0)

H. B. COLLIER

A lecture course on recent advances in the chemistry of mammalian erythrocytes, to include: structure and composition; the hemoglobins; metabolism and biochemical lesions; permeability and cation transport; the life span; blood storage.

Prerequisite: Biochemistry 50 or 300 or 71 or 350.

571. (104) Recent Advances (3-0; 0-0) or (0-0; 3-0)

MEMBERS OF THE DEPARTMENT

A lecture course on topics of current interest in Biochemistry, with reading of original literature.

Prerequisite: Biochemistry 50 or 300 or 71 or 350.

N.B.—Not all graduate courses are offered every year.

Students wishing to proceed to the degree of M.A., M.Sc., or Ph.D. in Biochemistry should consult the Head of the Department with regard to requirements and research facilities.

BIOLOGY

Instruction offered by members of the Departments of Botany and Zoology.

341. (41) General Biology (3-2; 3-0)

STAFF

Introduction to the plant and animal kingdoms; organization and development of plants and animals; adaptation to environment; variations, heredity and selection; evolution and origin of species; history of biology; biology and human welfare.

NOTE: This course is open to B.A. and B.Ed. students only. It is not open to first year students and may not be taken for credit by students who already have taken Botany 1a, 1b or 201, or Zoology 1 or 220.

BOTANY

Professors—H. J. Brodie (Head), R. G. H. Cormack, J. H. Whyte.
Associate Professors—Lorene L. Kennedy, A. R. Prince (Calgary).
Assistant Professors—G. A. Maclachlan and J. G. Packer.
Honorary Research Associate—Eleanor Silver Keeping.

Junior Course—

201. (1a, 1b) Elementary Botany (2-4; 2-4)

STAFF

First Term: Basic features of plant growth, structure and reproduction. Special reference to plants of economic importance. Relation of plant life to human welfare. Brief survey of plant kingdom.

Second Term: Survey of structure, life-cycles and evolution of all major groups of the plant kingdom. Biological interdependence of selected plant groups.

Senior Courses—

300. (50) Flowering Plants (3-3; 3-3)

J. G. PACKER

The origin and evolution of flowering plants; their morphology and classification; species concepts; plants in relation to their environment; principles of nomenclature.

Prerequisite: Botany 1a, 1b, or 201; or consent of instructor.

310. (51) Plant Anatomy and Histology (3-3; 3-3)

R. G. H. CORMACK

A course in the structure and development of organs and tissues of the higher plants. Emphasis is placed on the experimental approach to anatomical studies and on the environmental and physiological control of development and morphology.

Prerequisite: Botany 1a, 1b; or 201; or consent of instructor.

320. (52) Plant Physiology (3-3; 3-3)

J. H. WHYTE, G. A. MACLACHLAN

Fundamental aspects of physiology with particular reference to the higher plants. The physiology of the cell in terms of physical and colloid chemistry.

Prerequisites: Botany 1a, 1b or 201; Chemistry 35 or 230; or consent of instructor.

330. (53) Algae, Lichens and Mosses (3-3; 3-3)

LORENE L. KENNEDY

The structure, life histories and classification of the Algae, Lichens and Mosses with emphasis on native plants. Consideration is given to the evolution of these plant groups and to their role in nature.

Prerequisites: Botany 1a, 1b; or 201; or consent of instructor.

340. Mycology (3-3; 3-3)

H. J. BRODIE

Introductory survey of the Fungi.

First Term: Systematic survey of structures, life cycles and classification of representative types.

Second Term: Physiology, cytology, genetics of fungi with emphasis on types of economic importance and types currently being investigated.

Prerequisite: Botany 1a, 1b; or 201; or permission of instructor.

NOTE: Students in Agriculture may take the first term separately. All others must complete both terms.

350. (55) Lower Vascular Plants (3-3; 3-3)

The evolution and morphology of the Pteridophyta and Gymnospermae, including extinct groups.

400. Special Problems (6L; 6L)

STAFF

Assigned reading or laboratory projects.

Prerequisites: one elementary *and* one senior course in Botany.

Honor and Graduate Courses—

503. (103) Plant Geography and Ecology (6L; 6L)

R. G. H. CORMACK

A study of the distribution of plants over the earth's surface. Plant communities in relation to their environment. Throughout the course, studies relating to conservation, forestry and agriculture practices will be taken into consideration.

Prerequisites: Botany 50 or 300; Botany 52 or 320; or consent of the instructor.

504. (104) Advanced Mycology (6L; 6L)

H. J. BRODIE

Classification, morphology and physiology of the fungi.

Prerequisite: Botany 340.

505. (105) Advanced Physiology (6L; 6L)

J. H. WHYTE, G. A. MACLACHLAN

Prerequisites: Botany 51 and 52 or 310 and 320.

506. (106) Advanced Taxonomy (6L; 6L)

J. G. PACKER

Speciation and species problems in the flowering plants; cytotaxonomy and the use of experimental methods in taxonomy.

Prerequisites: Botany 50 or 300 or consent of instructor.

507. (107) Advanced Plant Anatomy and Histology (6L; 6L)

R. G. H. CORMACK

Modern methods of preparing plant material for microscopic examination, with practice in fixing, embedding, cutting and staining.

Prerequisite: Botany 51 or 310 or consent of instructor.

CHEMISTRY

Professors—H. E. Gunning (Head), R. K. Brown, L. C. Cragg, R. B. Sandin.

Associate Professors—W. F. Allen, S. G. Davis (Secretary), W. E. Harris, J. B. Hyne (Calgary), W. J. Wallace.

Assistant Professors—F. C. Adam (Calgary), D. A. Armstrong (Calgary), W. A. Ayer, F. W. Birss, R. J. Crawford, H. B. Dunford, D. Darwish, G. R. Freeman, P. Kebarle, P. J. Krueger (Calgary), R. N. O'Brien.

130 or A* (1 or A) Introductory General Chemistry (3-3; 3-3)

Lectures: An elementary introduction to Chemistry illustrated by the chemistry of metals, non-metals and of the carbon compounds.

Laboratory: Experiments related to the lecture material.

Offered at Summer School only.

230. (35 or 40) Inorganic Chemistry (3-1S-3; 3-1S-3)

S. G. Davis, G. R. Freeman, R. N. O'Brien and W. J. Wallace

Lectures: The fundamental concepts of Chemistry as applied to the elements and their compounds.

Laboratory: The preparation of some compounds; quantitative chemistry, and semi-micro qualitative analysis.

Prerequisite: Chemistry 1 or 130 or Chemistry 30 (High School) or equivalent.

Textbook: Sisler, Vander Werf, and Davidson, *General Chemistry.*

250. (39 or 42) Organic Chemistry** (3-3; 3-3)

R. B. Sandin and W. A. Ayer

Lectures: An introduction to a study of the compounds of carbon.

Laboratory: The preparation of some organic compounds.

Textbook: Fieser and Fieser, *Organic Chemistry;* or Noller, *Textbook of Organic Chemistry.*

Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd edition.

Prerequisite: Chemistry 1 or 130 or Chemistry 30 (High School) or equivalent.

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*Chemistry A is for students who have not completed university matriculation and wish to matriculate in Chemistry. No university credit will be given for this course.

**Students with credit in Chemistry 35 or 230 normally will proceed to Chemistry 350 not 250.

312. (58) Quantitative Analysis (3-6; 3-6)

W. E. Harris

Lectures: Principles and methods of quantitative analysis.

Laboratory: Gravimetric, volumetric, colorimetric and electrometric methods of analysis.

Prerequisites: Chemistry 35 or 36 or 40 or 230 or 232.

350. Organic Chemistry (3-3; 3-3)

R. K. Brown and R. J. Crawford

Lectures: An introduction to a study of the compounds of carbon.

Laboratory: The preparation of some organic compounds.

Textbook: Boyd and Morrison, *Organic Chemistry.*

Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd edition.

Prerequisites: Chemistry 35 or 36 or 40 or 130 or 230 or 232.

370. (53) Elementary Physical Chemistry (3-3; 3-3)

S. G. Davis

Lectures: Fundamental concepts of matter in relation to energy; thermochemistry; properties of gases, liquids and solids; solutions; equilibrium; phase rule; electrochemistry; colloids; kinetics of reaction.

Laboratory: Physico-chemical measurements.

Textbook: Maron and Prutton, *Principles of Physical Chemistry.*

Prerequisites: Chemistry 35 or 36 or 40 or 230 or 232; Physics 35 or 36 or 40 or 41 or 200 or 240; Mathematics 1 or 5 or 200 or 210.

372. (54) Elementary Physical Chemistry (3-1S-3; 3-1S-3)

H. B. DUNFORD

Lectures: Fundamental concepts of matter in relation to energy; thermochemistry, properties of gases, liquids and solids; solutions; equilibrium; phase rule, electrolytes, electromotive force, surface chemistry; kinetics of reaction.

Laboratory: Physico-chemical measurements.

Textbooks: Millard, *Physical Chemistry for Colleges;* Daniels, Matthews, Williams, Bender and Alberty, *Experimental Physical Chemistry.*

Prerequisites: Chemistry 35 or 36 or 40 or 230 or 232; Physics 35 or 36 or 40 or 41 or 200 or 240; Mathematics 40 or 304.

For honors students only, except by consent of the instructor.

430. (57) Inorganic Chemistry (2-3; 2-3)

W. J. WALLACE

A study of inorganic chemistry which includes the principles underlying the synthesis of less familiar compounds. Carbonyl, electron deficient, organometallic, and anhydrous compounds are included.

Laboratory: The preparation of some of the more unusual and different inorganic compounds.

Prerequisite: Chemistry 35 or 40 or 230.

Prerequisites or Corequisites: Chemistry 53 or 54 or 370 or 372 and 58 or 312.

450. (52) Organic Chemistry (3-3; 3-3)

D. DARWISH

Lectures: Continuation of the study of the aromatic and aliphatic compounds. General considerations and mechanisms involved in their reactions.

Textbook: Cram and Hammond, *Organic Chemistry.*

Laboratory: Preparation of some organic compounds.

Laboratory Textbook: Fieser, *Experiments in Organic Chemistry.*

Prerequisites: Chemistry 35 or 36 or 40 or 230 or 232 and 39 or 42 or 250 or 350.

Prerequisites or corequisites: Chemistry 53 or 54 or 370 or 372 and 58 or 312.

500. (110) Chemical Research

Students in their fourth year of honors who have first class standing may, after consultation with the department, pursue a half course in investigational work under the direction of a member of the department. The equivalent of at least eight hours per week of the second term must be spent on this course.

511. (105) Instrumental Methods of Analysis (0-0; 2-6)

W. E. HARRIS

Lectures: Theory and practice of instrumental methods of analysis.

Textbook: Willard, Merritt and Dean, *Instrumental Methods of Analysis.*

Prerequisite: Chemistry 58 or 312.

Prerequisite or Corequisite: Chemistry 53 or 54 or 370 or 372.

531. (106) Advanced Inorganic Chemistry (3-3; 0-0)

W. J. WALLACE

Lectures: A study of the Chemistry of the elements and of some of the factors which can affect the course of chemical reactions.

Laboratory: Preparation of a series of inorganic compounds which are designed to illustrate some of the less common and more difficult techniques of inorganic Chemistry.
Prerequisites: Chemistry 42 or 350, 53 or 54 or 370 or 372, 58 or 312.

550. (102) Organic Chemistry (3-6; 3-6)

R. B. SANDIN

Lectures: A continuation of Chemistry 250 or 350 (formerly 39 or 42).
Laboratory; Preparation of some compounds; the use of certain equipment such as that used for low-pressure hydrogeneration, etc., special techniques such as chromatographic adsorption, etc.
Textbook: Fuson, *Organic Chemistry;* Cram and Hammond, *Organic Chemistry*
Textbooks for Laboratory: Fieser, *Experiments in Organic Chemistry,* Part II; Gatterman and Wieland, *Laboratory Methods of Organic Chemistry.*
References: Fieser and Fieser, *Organic Chemistry;* Gilman, *Organic Chemistry —an Advanced Treatise,* Volumes I, II, III and IV; Wheland, *Resonance in Organic Chemistry;* Remick, *Electronic Interpretations of Organic Chemistry;* Alexander, *Principles of Ionic Organic Reactions.*
Prerequisites: Chemistry 39 or 250, 42 or 350, 58 or 312, and 53 or 370 or 54 or 372.

551. (109) Qualitative Organic Analysis (0-0; 2-6)

W. A. AYER

A study of the characteristic reactions of the various groups of organic compounds and the classification and identification of a number of unknowns from these reactions.
Textbooks: Shriner, Fuson and Curtin, *The Systematic Identification of Organic Compounds* (4th edition); Cheronis and Entaikin, *Semimicro Qualitative Organic Analysis* (2nd edition).
References: Kamm, *Qualitative Organic Analysis;* Clarke, *A Handbook of Organic Analysis;* Mulliken, *A Method for the Identification of Pure Organic Compounds,* Volumes I, II and IV; Huntress and Mulliken, *Identification of Pure Organic Compounds.*
Prerequisite: Chemistry 102 or 550.

553. (112) Chemistry of Carbohydrates (0-0; 3-3)

R. K. BROWN

Lectures: A study of monosaccharides, oligosaccharides and polysaccharides, their properties and derivatives.
References: Pigman, *The Carbohydrates; Advances in Carbohydrate Chemistry.*

555. (114) Theoretical Organic Chemistry (3-0; 0-0)

R. J. CRAWFORD

The applications of current theories to various classifications of reactions are considered. Hammett's correlation of reaction rates, stereochemistry, kinetics, resonance, and factors important to the course of a reaction are discussed.
Textbook: Hines, *Physical Organic Chemistry.*
References: Newman, *Steric Effects in Organic Chemistry;* Ingold, *Structure and Mechanism in Organic Chemistry;* Klyne, *Progress in Stereochemistry.*
Prerequisite: Chemistry 102 or 550.

557. Physical Organic Chemistry (0-0; 3-0)

D. Darwish

A discussion of selected topics in physical organic chemistry. A continuation of topics discussed in Chemistry 555 (formerly 114).

Textbook: Hammett, *Physical Organic Chemistry.*

559. Natural Products (3-0; 0-0)

W. A. Ayer

The chemistry of some alkaloids, terpenoids, steroids, and microbial metabolic products; structural determination, possible modes of biogenesis, and synthesis of biogenesis, and synthesis of some of these compounds will be discussed.

Prerequisite: Chemistry 102 or 550.

571. (107) Colloid Chemistry and Surface Chemistry (3-3; 0-0)

A course dealing with the kinetic and electrical properties of colloidal systems, adsorption at interfaces, thermodynamics of surfaces, theories of adsorption, catalysis.

Textbook: Jirgensons and Straumanis, *Colloid Chemistry.*

Prerequisites: Chemistry 42 or 350, 54 or 372; Mathematics 40 or 304.

(Not offered in 1960-61).

573. (108) Electrochemistry (0-0; 2-6)

Lectures: The Debye-Huckel theory of solutions; polarization and overvoltage, deposition and corrosion of metals, electrolytic oxidation and reduction, reversible cells.

Laboratory: Electrochemical measurements and preparations.

Textbook: Glasstone, *An Introduction to Electrochemistry.*

Prerequisites: Chemistry 54 or 372, 58 or 312.

Corequisite: Physics 46 or 380.

(Not offered in 1960-61).

575. (111) Gas Kinetics (3-0; 0-0)

G. R. Freeman

Empirical treatment of reaction rates, collision theory, transition state theory, chain reactions, some specific reaction mechanisms.

Textbook: Frost and Pearson, *Kinetics and Mechanism.*

Prerequisite: Chemistry 53 or 54 or 370 or 372.

577. (113) The Phase Rule and Heterogeneous Equilibria (0-0; 3-0)

The fundamental relations between solid, liquid, and gas phases of single and multicomponent systems as revealed by Gibb phase rule. Applications will include the iron-carbon systems of steel manufacturers, and the lime-silica-alumina systems of interest in Portland cement manufacture and to geologists.

Prerequisites: Chemistry 54 or 372.

(Not offered in 1960-61).

579. (115) Chemical Thermodynamics (3-0; 0-0)

R. N. O'Brien

Applications of the three laws of thermodynamics to chemical systems; thermodynamics of systems of variable composition.

Textbook: Klotz, *Chemical Thermodynamics.*

Prerequisite: Chemistry 54 or 372.

581. (116) High Vacuum Technique (3-0; 0-0)

P. KEBARLE

A discussion of High Vacuum Technique including the theory and methods of production, measurements of high vacua, and the manipulation of gases and liquids in such systems. The fundamentals of electronics and electronic equipment used in the measurements is also included.

583. Quantum and Statistical Mechanics (0-0; 3-0)

F. BIRCS

An elementary course in quantum and wave mechanics with applications to chemical problems.

Textbook: K. Pitzer, *Quantum Chemistry.*

585. Solution Kinetics (0-0; 3-0)

H. B. DUNFORD

The study of chemical reactions in non-polar and polar solvents; Debye-Huckel theory; primary and secondary salt effects; acid-base catalysis.

Textbook: Frost and Pearson, *Kinetics and Mechanisms.*

References: Amis, *Kinetics of Chemical Change in Solution,* Bell, *Acid-Base Catalysis;* Hine, *Physical Organic Chemistry;* Laidler, *Chemical Kinetics.*

Prerequisites: Chemistry 54 or 372 and one of Chemistry 111 or 114 or 555 or 575.

587. Infrared and Raman Spectra (0-0; 3-0)

P. KRUEGER

The relation of infrared and Raman spectra to molecular structure; experimental techniques; and effect of solvent and other factors influencing spectra. Current research literature in the field will be stressed.

(Offered in Calgary only).

602. Departmental Research Seminar (2S-0; 2S-0)

H. E. GUNNING

Reports on studies of the literature or of current research in the Department. Required of each year of all graduate students in the Department of Chemistry and the fourth year honors students.

604. Advanced Research Seminar (2S-0; 2S-0)

CHEMISTRY STAFF

Reports on topics related to the fields of specialization of the graduate student. These seminars will be set up by the various members of staff as required.

611. Analytical Chemistry (0-0; 3-0)

W. E. HARRIS

Lectures of Chemistry 511.

631. Inorganic Chemistry (3-0; 0-0)

W. J. WALLACE

Lectures of Chemistry 531.

651. Organic Chemistry (3-0; 0-0)

R. B. SANDIN

Lectures of Chemistry 550.

653. Organic Chemistry (0-0; 3-0)

R. B. Sandin

Lectures of Chemistry 550.

670. (104) Advanced Physical Chemistry (0-0; 3-0)

H. E. Gunning

Kinetic theory of gases, quantum mechanics, statistical mechanics, chemical kinetics and photo-chemistry.

Prerequisite: Chemistry 54 or 372.

Prerequisite or corequisite: Mathematics 52 or 57 or 420 or 404.

671. Physical Chemistry (4-0; 0-0)

H. B. Dunford

Lectures of 372, plus 1 hour per week of special topics.

673. Physical Chemistry (0-0; 4-0)

H. B. Dunford

Lectures of 372, plus 1 hour per week of special topics.

CLASSICS

Professor—W. G. Hardy (Head).

Associate Professor—A. D. Winspear (Calgary).

Assistant Professors—R. J. Buck, E. C. May, Margery W. Mackenzie.

Latin

Junior Courses—

100. or A (1 or A) Beginners' Latin (5-0; 5-0)

E. C. May

Introduction to Latin (Miller: University of Pittsburgh).

This course is to enable students who enter the University without Latin to begin the study of this language in university. It is concerned with the essentials of grammar, syntax, the reading of easy Latin and prose composition. A secondary emphasis is placed on the connexion of English with Latin.

200. (2) Latin Authors and Prose Composition (3-0; 3-0)

R. J. Buck and Margery MacKenzie

Caesar, *De Bello Gallico,* Book IV (Shuckburgh: Macmillan); Cicero, *An Easy Selection from Cicero's Correspondence* (Duff: Macmillan); Vergil, *Aeneid,* Book II (Sidgwick: Macmillan). *Latin Prose Composition* (Franklin and Bruce: Longman, Green and Co.).

For students with matriculation in Latin or with Latin A or 100.

Senior Courses—

300. (40) Latin Authors and Prose Composition (3-0; 3-0)

Margery MacKenzie

A Latin Reader (Petrie: Oxford); *Latin Prose Composition* (Franklin and Bruce: Longman, Green and Co.). Sight translation and principles of language. For students proceeding from Latin 200 (2).

353. (53) Horace, Tacitus and Juvenal (3-0; 3-0)

W. G. HARDY

Horace, *Satires* (Morrison: American Book Co.).
Tacitus, *Annals,* I-IV (Furneaux: Oxford).
Juvenal, *Selections* (Bolton: Harrap).
(Not offered in 1960-61).

354. (54) Cicero, Horace, Sallust (3-0; 3-0)

W. G. HARDY

Cicero, *Pro Lege Manilia* (Wilkins: Macmillan).
Horace, *Odes* (Page: Macmillan).
Sallust, *Catilina,* (Nall: Macmillan).

355. (55) Plautus, Terence, Vergil (3-0; 3-0)

W. G. HARDY

Plautus, *Menaechmi* (Jones: Oxford).
Terence, *Adelphoe* (Ashmore; Macmillan).
Vergil, *Aeneid,* Book VI (Sidgwick: Macmillan).
(Not offered in 1960-61).

Honor and Graduate Courses—

502. (102) Roman Comedy (3-0; 3-0)

W. G. HARDY

505. (105) Vergil, Complete Works (3-0; 3-0)

W. G. HARDY

507. (107) Petronius, Apuleius (3-0; 3-0)

W. G. HARDY

508. (108) Tacitus (3-0; 3-0)

W. G. HARDY

The reading of Tacitus, *Annales,* Books I-IV, together with selections from Tacitus, *Historiae, to* be combined with a study of the History and Literature of the Early Empire.

509. (109) Tibullus, Propertius, Ovid (Amores).

W. G. HARDY

511. (111) Advanced Latin Prose Composition (1-0; 1-0)

Greek

Junior Courses—

100. (1) Beginners' Greek (5-0; 5-0)

MARGERY MACKENZIE

First Greek Book (White: Ginn); *A Greek Reader* (Colson: Macmillan).

Senior Courses—

300. (40) Greek Authors and Prose Composition (3-0; 3-0)

E. C. MAY

A Greek Reader (Colson: Macmillan); Xenophon, *Anabasis,* III (Edwards: Cambridge); *Greek Prose Composition* (North and Hillard: Rivington).
Sight translation. Review of Greek forms. More difficult sentences for translation into Greek.

352. (52) Thucydides, Euripides, Plato (3-0; 3-0)

E. C. MAY

Thucydides, Book I (Marchant: Macmillan); Euripides, *Medea* (Verrall: Macmillan); Plato, *Apology*.

353. (53) Plato, Sophocles, Aristophanes (3-0; 3-0)

R. J. BUCK

Plato, *Republic,* Books I-II (Adam: Cambridge); Sophocles, *Antigone* (Jebb: Cambridge); Aristophanes, *Clouds* (Merry: Oxford).

354. (54) Aeschylus, Demosthenes, Thucydides (3-0; 3-0)

E. C. MAY

(Not offered in 1959-60).

Honor and Graduate Courses—

501. (101) Plato and Aristotle (3-0; 3-0)

502. (102) Homer, Iliad (3-0; 3-0)

503. (103) Pindar, Odes (Selections) (3-0; 3-0)

511. (111) Advanced Greek Prose Composition (3-0; 3-0)

515. (115) Greek and Latin Epigraphy and Palaeography (3-0; 3-0)

W. G. HARDY

Survey Courses in the Life and Thought of the Ancient World

350. (50) Classics in English (Greek) (3-0; 3-0)

W. G. HARDY

Greek Life and Letters from Homer to Lucian

A study of life and thought in the Greek world for the period indicated. This will be based (a) on the literary documents, (b) on the department's collection of slides illustrating Greek art, architecture and natural environment. While a knowledge of Greek is highly desirable, it is not a prerequisite, as the literary documents are dealt with in translation.

This course is an option for second and third year students in Arts and Science in the A group.

Reading of selected Greek authors in translation.

Textbooks: Livingstone, *The Greek Genius* (Oxford); Hamilton, *Greece—A Short History* (Oxford).

351. (51) Classics in English (Latin) (3-0; 3-0)

R. J. BUCK

Latin Literature from Ennius to Suetonius

A study of life and thought in the Roman world for the period indicated. While a knowledge of Latin is highly desirable, it is not a prerequisite, as the literary documents are dealt with in translation.

This course forms the natural sequence to Classics in English 350 (old 50), with which it is closely related. It is an open option for second and third year students in Arts and Science in the A group.

Textbooks: *Roman Literature* (Grant: Cambridge); *Latin Literature in Translation* (Guinagh and Dorjahn: Longmans); *Rome* (W. Warde Fowler: Oxford).
(Not offered in 1960-61).

352. (52) History of Ancient Greece: The Influence of the Greek Genius on the Western World (3-0; 3-0)

E. C. May

The story of the Hellenic world from its beginnings in the Minoan-Mycenaean civilizations of Crete and Greece until the time of Alexander the Great with special attention to the political organization of the city-state and the beginnings of democracy, and to cultural and economic development.
Textbook: Trever, *History of Ancient Civilization,* Vol. I.

353. (53) Roman History: The Roman Genius in the Mediterranean World (3-0; 3-0)

Margery MacKenzie

A study of the development of the Roman Republic and its expansion from city-state to empire. Particular attention will be given to the Roman methods of organization, law and government, and to the way in which the Romans impressed their culture on the Mediterranean world and on Western Europe.
Textbook: Trever, *History of Ancient Civilization,* Vol. II.

354. (54) History of Ancient Art (3-0; 3-0)

E. C. May

A history of the rise and progress of ancient art from the Cretan period through the Graeco-Roman age. An examination of the aims and principles underlying ancient art. The course will be fully illustrated from the department's collection of slides and photographs. This course is an open option in Division A for all students in the second and third years of the Faculty of Arts and Science.

355. (55) Primitive Human Culture

A study of the origins and development of culture from early Quaternary times until the end of the Neolithic period.
(This course offered at Summer Sessions only.)

356. (56) Early Civilization (3-0; 3-0)

R. J. Buck

The origin and development of human culture will be traced through the Palaeolithic, Mesolithic, Neolithic, Chalcolithic, Bronze and Iron Ages. Special attention will be given to Europe, the early civilizations of the Near East and the Minoan Civilization.
Textbooks: Le Gros Clark, *History of the Primates* (British Museum); Oakley, *Man the Toolmaker* (British Museum); Cottrell, *The Anvil of Civilization* (Mentor Books).
Reference books: Breasted, *Ancient Times;* Murray, *The Splendor That Was Egypt;* Woolley, *The Sumerians.*

357. (57) Early Civilization

A study of the beginnings of civilizations in the Mediterranean world: Egypt, the Fertile Crescent, Crete and Greece, the Assyrian Empire.
(This course offered at Summer Sessions only.)

DRAMA

See under Fine Arts

ECONOMICS

See under Political Economy

EDUCATION

Instruction offered by members of the Divisions of Educational Psychology and Secondary Education in the Faculty of Education.

476. Educational Psychology (3-0; 3-0)

G. M. Dunlop

Individual differences; psychology of learning and forgetting; motivation; personality, adjustment, and mental hygiene; introduction to evaluation and the testing program.

Prerequisite: Education 176 or 276, Psychology 40 or 202, or equivalent.

492. Philosophy of Education (3-0; 3-0)

H. S. Baker and B. E. Walker

Philosophical bases of education, with particular reference to values, aims, curriculum, and the educative process.

Prerequisite: Philosophy 40 or 52 or 54 or 61 or 240 or 352 or 354 or 360. Philosophy 44 or 56 or 246 or 356 may be substituted by Roman Catholic students.

ENGLISH

Professors—J. T. Jones (Head), H. Kreisel, F. M. Salter, M. H. Scargill (Calgary)

Associate Professors—R. G. Baldwin, A. T. Elder (Secretary of the Department), D. R. Godfrey, E. F. Guy (Calgary), E. W. Mandel, A. A. Ryan, W. Watson

Assistant Professors—I. Adam (Calgary), F. Bessai, J. W. Bilsland, D. F. Chapin, J. P. Cutts, J. F. Forrest, L. J. Logie (Calgary), R. D. McMaster, E. J. Rose, I. C. Sowton, Birgitta Steene, W. C. Strange, Alice G. White

Junior Courses—

Note: Some patterns require English 200, some require English 210, and some permit either to be taken.

200. (2) First Course in English Literature (3-0; 3-0)

Members of the Department

A close study of representative masterpieces, with some attention to the historical development of English Literature. Essays and tests on the prescribed literature will be given to afford practice in setting down ideas in good English.

Texts: Chaucer, the General Prologue and selections from the *Canterbury Tales; Everyman;* Malory, selected tales; Marlowe, *Dr. Faustus;* Shakespeare,

King Lear; Jonson, *Volpone;* Spenser, *The Faerie Queene,* Book one; Donne, selected poems; Milton, *Samson Agonistes, Ode on the Morning of Christ's Nativity, Lycidas;* Dryden, selected poems and *An Essay of Dramatic Poesy;* Congreve, *The Way of the World;* Pope, selected poems; Swift, *Gulliver's Travels;* Addison and Steele, essays; Fielding, *Tom Jones;* Johnson, *Preface to Shakespeare, Life of Pope;* Boswell. selections from *The Life of Samuel Johnson;* Vallins, *Good English.*

210. (5S) English Language and Literature (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.

Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rinehart); Shaw, *Saint Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

Senior Courses—

NOTE:—English 200 (formerly 2) or 210 (formerly 5S) or 230 (formerly 5E) is a prerequisite for senior English courses.

308. (71) Old English and the History of the Language (4-0; 4-0)

D. F. CHAPIN

A study of selected Old English texts, together with a history of the language to the present day.

Texts: Sweet, *Anglo-Saxon Primer,* revised by Davis (Oxford); Magoun, *Anglo-Saxon Poems* (Harvard); Magoun, *Beowulf and Judith* (Harvard); Madden and Magoun, *A Grouped Frequency Word-List of Anglo-Saxon Poetry* (Harvard); Bessinger and Madden, *A Short Dictionary of Anglo-Saxon Poetry* (Toronto).

316. (62) Chaucer (3-0; 3-0)

A. A. RYAN

Lectures on English mediaeval literature. Special study of Chaucer's *Troilus and Criseyde,* and of the *Canterbury Tales.*

Texts: Chaucer, *Complete Works.* ed. Robinson, 2nd edition, 1957 (Houghton-Mifflin); Langland, *Piers the Plowman,* ed Skeat (Clarendon Press).

324. (69) Nondramatic Literature of the English Renaissance (3-0; 3-0)

I. C. SOWTON

Texts: More, *Utopia* (ed. J. C. Collins, Oxford); Erasmus, *The Praise of Folly* (tr. Dean, Chicago: Packard); Castiglione, *The Courtier* (Everyman's); Bacon, *The Advancement of Learning,* Book I (Macmillan); Hooker, Preface to *Laws of Ecclesiastical Polity* (Cambridge Plain Texts); *Elizabethan Fiction* (Rinehart); Spenser, *The Faerie Queene,* Bks. I and II (ed. Winstanley, Cambridge), and *The Shepherd's Calendar* (Everyman's); *Silver Poets of XVI Century* (Everyman's); Donne, *Complete Poetry and Selected Prose* (Modern Library); Sidney, *Apologie for Poetrie* (Cambridge); Shakespeare, *Sonnets* (ed. to be announced).

332. (53) Shakespeare (3-0; 3-0)

JOHN P. CUTTS

A study of Shakespeare's development as a dramatist. Eighteen plays will be discussed, not all in great detail. Among them will be the following:—*The Comedy of Errors* or *Love's Labour's Lost, Richard III, Romeo and Juliet, Richard II, Henry IV,* Part I, *Henry IV,* Part II, *Henry V, Hamlet, Othello, King Lear, Macbeth, Antony and Cleopatra, The Tempest.*

Text: To be announced.

340. (60) Milton (3-0; 3-0)

J. T. JONES

A study of Milton's prose and poetry.

Texts: *John Milton: Prose Selections,* ed. M. Y. Hughes (Odyssey Press); *The Poems of John Milton* (Oxford Standard Authors).

(Not offered in 1960-61).

344. Seventeenth Century Poetry and Prose (3-0; 3-0)

WILFRED WATSON

The literature of the seventeenth century, studied in the light of the intellectual developments of the period.

Text: White, Wallerstein, and Quintana, ed., *Seventeenth-Century Verse and Prose,* Vol. I, Brett-Macmillan, 1951.

348. (63) Restoration and Eighteenth Century Literature (3-0; 3-0)

A. T. ELDER

Special study of representative works of Dryden, Swift, Pope, Addison, and Johnson, with additional reading in the drama, poetry, and prose of the period.

Texts: Bredvold, McKillop, Whitney. ed., *Eighteenth Century Poetry and Prose;* Swift, *Gulliver's Travels, Tale of a Tub, Battle of the Books* (Modern Library); *Twelve Famous Plays of the Restoration and Eighteenth Century* (Modern Library); Johnson, *Lives of the English Poets* (World's Classics, Vols. I and II).

356. (57) Poetry and Prose of the Romantic Period (3-0; 3-0)

D. R. GODFREY

Selections from Crabbe, Cowper, Burns, Blake, Burke, Wordsworth, Coleridge, Scott, Lamb, Hazlitt, De Quincey, Byron, Shelley, Keats.

Text: *English Romantic Poetry and Prose,* ed. Noyes (Oxford University Press).

364. (66) Poetry of the Victorian Period (3-0; 3-0)

E. W. MANDEL

The works of Tennyson, Browning, Arnold, and other Victorian poets.

Text: *Victorian Poetry and Poetics,* ed. Houghton and Stange (Houghton-Mifflin).

372. (59) Currents of Thought in Victorian Prose Literature (3-0; 3-0)

R. D. MCMASTER

Texts: J. S. Mill, *Liberty, Utilitarianism* (Everyman's Library); *Sartor Resartus* (Everyman's Library); *Past and Present* (Everyman); Newman, *Apologia* (Everyman); *Idea of a University* (Cambridge University Press);

Ruskin, *Selections and Essays.* ed. Roe (Scribners); Ruskin, *Unto This Last* (University Tutorial Press); Huxley, *Selections,* ed. Castell (Crofts); Butler, *Erewhon* (Nelson).

380. (64) Early Twentieth Century (3-0; 3-0)

H. KREISEL

Representative plays by Shaw, Wilde, Galsworthy, Yeats, Synge, O'Casey, T. S. Eliot, Fry. Conrad, *Lord Jim;* Wells, *Tono-Bungay;* Forster, *Passage to India;* Bennett, *The Old Wives' Tale;* Lawrence, *Sons and Lovers;* Joyce, *A Portrait of the Artist as a Young man;* Huxley, *Antic Hay;* Woolf, *Mrs. Dalloway;* Williams, *Little Treasury of Modern Poetry* (Scribners)

388. (70) History of the English Language (3-0; 3-0)

A descriptive history of the growth and structure of the English language from the earliest times to the present day.

Texts: A. C. Baugh, *History of the English Language* (Appleton Century); A. H. Marckwardt, *Introduction to the English Language* (Oxford University Press).

(Not offered in 1960-61).

390. (72) English Drama from the Beginnings to 1700 (3-0; 3-0)

W. C. STRANGE

Texts: To be announced.

392. (52) The English Novel (3-0; 3-0)

R. G. BALDWIN

Students are required to read the following works: Defoe, *Moll Flanders;* Richardson, *Pamela;* Fielding, *Tom Jones;* Smollett, *Roderick Random;* Sterne, *Tristram Shandy;* Goldsmith, *Vicar of Wakefield;* Jane Austen, *Emma;* Scott, *Heart of Midlothian;* Dickens, *Great Expectations;* Thackeray, *Henry Esmond,* Trollope, *Barchester Towers;* Charlotte Brontë, *Jane Eyre;* George Eliot, Adam Bede; Meredith, *The Egotist;* Hardy, *Tess of the d'Urbervilles;* Forster, *Passage to India.*

393. The History of Literary Criticism (3-0; 3-0)

J. W. BILSLAND

A survey of the major developments in literary criticism from Aristotle to the present time.

Text: Smith and Parks, ed., *The Great Critics* (Norton).

394. (51) English Literature of the North American Continent (3-0; 3-0)

E. J. ROSE

American literature, with special attention to writers who have made original contributions to English literature generally. A brief survey of Canadian literature will couclude the course.

Texts: To be announced.

396. (65) Senior Course in English Composition (3-0; 3-0)

F. M. SALTER

Before registering in this course, students must obtain the consent of the instructor, preferably at the end of the previous session. This course, which offers advanced training in composition, is intended for students who are

fitting themselves to teach and for others who are interested in the study and practice of writing.

Honors and Graduate Courses—

500. (109) Conference Course

Special work arranged for senior honors students.

504. (112) Special Program of Reading for Honors Students

Early in his third year the honors English student, in consultation with the department, will select a special program of reading to be followed under the guidance of a member of the department for the ensuing two years. This program of reading may be based upon the study of an author, a period or a literary species. The student will do his work in this course without class instruction and will present the results in frequent reports and essays.

552. (140) Conference Course (English 552 offers guidance in special reading courses in any field of English Literature. It is designed to fill in background studies for theses.) (3-0; 3-0)

560. (141) Bibliography and Methods of Research (1-0; 1-0)

568. (142) Literary Criticism (Principles and History) (3-0; 3-0)

576. (143) Study of Language (A synthesis of various approaches to the nature and use of language—historical, synchronic, comparative, philosophical, aesthetic.) (2-0; 2-0)

584. (144) Advanced Course in Writing (3-0; 3-0)

588. Studies in American Literature (3-0; 3-0)

592. (150) Old Norse and Germanic Philology (3-0; 3-0)

610. (151) Old English (3-0; 3-0)

616. (152) Chaucer and his Contemporaries (3-0; 3-0)

622. (153) The Scottish Chaucerians and English Literature of the Fifteenth Century (3-0; 3-0)

628. (154) Mediaeval Drama (3-0; 3-0)

634. (160) Spenser and Donne (3-0; 3-0)

640. (161) Shakespeare and his Contemporaries (3-0; 3-0)

646. (162) Early Seventeenth Century Poetry and Prose (3-0; 3-0)

652. (163) Milton (3-0; 3-0)

658. (171) Eighteenth Century Prose (3-0; 3-0)

664. (180) Wordsworth and Coleridge (3-0; 3-0)

670. (181) Nineteenth Century Thought (3-0; 3-0)

676. (190) Studies in the Modern Novel (3-0; 3-0)

682. (192) Poetry in English since 1939 (3-0; 3-0)

NOTE: The following graduate courses will be offered in the term 1960-61: English 560 (J. W. Bilsland), English 628 (F. M. Salter), and English 670 (E. W. Mandel and R. D. McMaster).

ENTOMOLOGY

Instruction offered by members of the Department of Entomology, Faculty of Agriculture.

301. (41) General Entomology (3-3; 3-3)

B. Hocking and G. E. Ball

Probable origin of insects, their structure and development. Introduction to classification. Their interrelationships with other forms of life as a basis to an appreciation of their significance in connection with agriculture and human health.

Textbook: Imms, *Outlines of Entomology.*

Prerequisite or corequisite: Biology 41 or 341 or at least one half course in both Botany and Zoology.

414. (64) Morphology (1-5; 1-5)

G. E. Ball and B. Hocking

A detailed study of the structure of insects from the comparative and functional viewpoints.

Textbook: Snodgrass, *Principles of Insect Morphology.*

Prerequisite or corequisite: Entomology 41 or 301.

422. (62) Taxonomy (3-3; 3-3)

G. E. Ball

Taxonomic principles and procedures. Classification of insects; habits of all important groups. Intending students are advised to make a general collection of at least 100 species of insects.

Textbook: Mayr, Linsley, and Usinger, *Methods and Principles of Systematic Zoology.*

Prerequisite or corequisite: Entomology 41 or 301, Entomology 64 or 414 desirable.

456. (66) Insect Physiology (2-4; 2-4)

B. Hocking

Life processes illustrated by insects with emphasis on those peculiar to them and their relatives.

Textbook: Wigglesworth, *The Principles of Insect Physiology.*

Prerequisite or corequisite: Entomology 40 or 41 or 301, Entomology 64 or 414 desirable.

475. (65) Insect Toxicology (3L; 3L)

W. G. Evans

The chemistry of insecticides and repellents and of accessory materials. Methods of insecticide evaluation. Theories of insecticidal activity.

Textbook: Shepard, *The Chemistry and Action of Insecticides.*

Prerequisite: Chemistry 42 or 350, Entomology 40 or 41 or 300 or 301 desirable.

512. (102) Advanced Morphology, Physiology and Histology (0-6; 0-6)

B. Hocking

A continuing course from Entomology 414 (old 64) and 456 (old 66), including detailed study of the morphology of an insect species, or of a

particular structure in a number of insects, and more advanced practical work in physiology and histology.
Textbook: Wigglesworth, *The Principles of Insect Physiology.*

521. (101) Taxonomy for Graduate Students (0-6; 0-6)

G. E. Ball

A continuation of studies begun in Entomology 523 (old 63). Includes the preparation of synoptic tables, descriptions and illustrations of species, study of available literature upon the biology of all species in certain groups and the preparation of at least one systematic article for publication.

523. (63) Advanced Taxonomy (0-6; 0-6)

G. E. Ball

Classification and biology of, and literature upon, one or more of the major orders of insects. Intending students should have prepared a general collection which shall include at least fifty species in any major order that they select for special study.
Prerequisite: Entomology 62 or 422.

FINE ARTS

Professors—H. G. Glyde (Head), R. S. Eaton
Associate Professors—A. B. Crighton, G. B. Peacock, J. B. Taylor
Assistant Professors—F. F. Bueckert, T. Rolston, R. Stangeland, E. N. Yates

Art

Diploma Program in Art

H. G. Glyde and Art Staff

A four-year course offering a comprehensive study of drawing, painting and design. This is outlined on page 79.
Apply to the Registrar for further particulars including entrance requirements. Consult Banff School calendar for further information on art courses.

240. (40) Fundamentals of Drawing (3-3; 3-3)

H. G. Glyde and N. Yates

Theory and practice of drawing; analysis of masters' drawings; study of line, form, pattern, light and shade; portrait and figure construction; life drawing using both long and quick poses.
Textbook: Nicolaides, *The Natural Way to Draw.*

250. (42) Fundamentals of Painting (3-3; 3-3)

J. B. Taylor

Theory and practice of painting in oils; forms in space; analysis of line, pattern and form in painting; study of arrangements, both two-dimensional and three-dimensional; use of light and shade; application of pigments in both monochrome and color.
Prerequisite: Art 40 or 240.

300. (51) Art History and Appreciation (3-0; 3-0)

J. B. Taylor

A general survey of architecture, painting and sculpture and minor arts

in the following periods: Primitive, Egyptian, Greek, Etruscan, Roman, Byzantine, Celtic, Romanesque, Gothic and Italian Renaissance.

Analysis of compositions by the great masters of the various schools of painting.

Textbook: Gardner, *Art Through the Ages.*

330. (53) Pictorial Composition **(2-3; 2-3)**

J. B. Taylor

Analysis of master compositions from the various schools of painting; theory and practice in arranging forms, both in the two-dimensional and in space; exercises in figure grouping; conventional treatment of natural forms for decorative painting; uses of various techniques.

Prerequisite: Art 40 or 240 (for Arts and Science students only).

340. (54) Advanced Drawing **(2-3; 2-3)**

H. G. Glyde

Portrait and life drawing; drawing from memory and visualization; some anatomical drawing; study of the third dimension, light and shade, etc., from both the figure and draped model.

Prerequisite: Art 40 or 240.

400. (61) Art History and Appreciation **(3-0; 3-0)**

E. N. Yates

Survey of Art in Europe from Renaissance to modern times.

Analysis of architecture, sculpture, painting and graphic arts of the following periods: Flemish and German, fourteenth to sixteenth centuries; Spanish, fifteenth to eighteenth centuries; Dutch, English and French, sixteenth to nineteenth centuries.

Modern schools, French, English, American and Canadian, etc.

Textbook: Gardner, *Art Through the Ages.*

Prerequisite: Art 51 or 300 (for Arts and Science students only).

450. (62) Advanced Painting **(2-4; 2-4)**

E. N. Yates and J. B .Taylor

Painting from the model: portrait, figure and costume; lectures on painting techniques used by the masters of the Renaissance and modern schools; theory and practice of applying pigments on various grounds in both the direct and indirect methods.

Prerequisite: Art 42 or 250.

Drama

250. (35) Elementary Acting and Stagecraft **(3-3; 3-3)**

F. Bueckert and G. Peacock

(a) Acting: Practical and theoretical through improvisation, stage performance and discussion. Emphasis is placed on the development of the actor through preparation for a role, acting scenes, and basic speech and body work. Elementary makeup.

(b) Stagecraft: Construction and painting of scenery; lighting; costumes; some reference to design.

Textbook: Milton Smith, *Play Production.*

300. (51) The History of the Theatre to the Middle of the Nineteenth Century (3-0;3-0)

G. Peacock

Emphasizes production methods, the structure and background of plays and other theatrical productions. A considerable amount of outside reading will be assigned throughout the year, including the reading of plays and critical essays.

Textbook: Gassner, *Masters of the Drama.*

(Offered alternate years. Offered in 1960-61.)

350. (53) Advanced Acting (3-3; 3-3)

G. Peacock

(a) Further study and exercises in character creation, voice production, development of acting techniques.

(b) 1. Practical work in major productions and one-act plays.
2. Training in the styles of acting: Contemporary, Restoration, Shakespearean, Greek.

Prerequisite: Drama 35 or 250.

360. (40) Voice and Speech (3-0; 3-0)

F. Bueckert

This is an introductory course in speech with emphasis upon oral interpretation. The first session will be devoted to a discussion of the importance of our spoken language, a study of the vocal mechanism and causes of poor phonation, and practice in the production of voice and speech. The second session will be concerned with the expression of personality through speech, audience psychology, oral interpretation and practice. Some reference will be made to other speech situations.

Before registering in this course, students must obtain the consent of the instructor.

400. (52) The Modern Theatre (3-0; 3-0)

G. Peacock

The development of the modern theatre from Ibsen to the present day. The aesthetics of the theatre. A considerable amount of outside reading will be assigned throughout the year, including the reading of plays and critical essays.

Textbook: Gassner, *Masters of the Drama.*

(Offered alternate years. Not offered in 1960-61.)

450. (55) Stage Direction (3-3; 3-3)

F. Bueckert

(a) A study of the problems of play selection, casting, preparation of a script and conduct of rehearsals; techniques involved in production.

(b) Practical
1. Each member of the class is given the opportunity to work with the director of a major production in a responsible capacity.
2. In the second term the class will be responsible for the direction of several one-act plays.

Prerequisite: Drama 35 or 250.
Textbook: Alexander Dean, *Fundamentals of Play Production.*

460. (61) Playwriting

(N.B. This course is given only at the Banff School of Fine Arts.)
A practical course in the composition of the one-act play and in the teaching of playwriting. Some emphasis will be placed on the use of material based on Alberta and allied regional Canadian themes. In addition to a series of written dialogues as exercises in exposition, development of plot and character, etc., each student will be required to complete at least one one-act play. Students taking this course for credit in the University of Alberta have first to show satisfactory evidence of advanced work in acting, directing and theatre background.

Music

100. An Introduction to Concert Music (3-0;3-0)

Members of the Music Division

An elmentary course in the history and appreciation of concert music. Composers, styles and musical forms of the standard repertory will be studied. Attendance at prescribed concerts and rehearsals will be arranged.
No prerequisite.
Textbook: Stringham, *Listening to Music Creatively,* (2nd edition).
Music 100 will *not* be accepted as a prerequisite for Music 200.

200. (35 or 41) History of Music and Choral Technique (2-3*; 2-3*)

R. S. Eaton and T. Rolston

Elementary theory and practice of singing, choral technique and interpretation, sight singing and ear training. History of music. Introduction to form. Instruments of the orchestra. Assignments include one hour weekly of prescribed listening; records and scores are provided and the listening room is reserved at various times for small groups. Weekly reading will be assigned, part of it related to the listening.
Theory: The student will be required in February (of the session in which the course is taken), to pass an elementary examination in notation with 80% standing.
Textbooks: Staton, *Sweet Singing in the Choir;* Martin Berstein, *An Introduction to Music;* Horwood, *Basis of Music.*
Prerequisite: (a) Western Board of Music Grade III theory or equivalent, *and*
(b) Western Board of Music Grade V practical or equivalent.

203. Woodwind Instruments (0-3; 0-3)

A class in the principles and practice of woodwind instruments. This course is a requisite in the first year of the B.Mus. program.

250. (45) Elementary Harmony and Counterpoint (2-3*; 2-3*)

T. Rolston

Free counterpoint in two and three parts. Diatonic harmony, including secondary sevenths. Modulation. Use of unessential notes of all kinds. Harmonizing of chorales in the style of Bach. A detailed study of musical form and analysis.

*Laboratory: Form; ear training and keyboard harmony; choral.
Textbooks: Dyson, *Musicianship for Students'* Book I; Macpherson, *Form in Music.*

300. (51) History of Music (2-2*; 2-2*)

R. S. EATON

A study of the history of music from the year 1600 to 1900. Scores and records of music are provided. A critical evaluation of the styles of the various composers is emphasized. Detailed study of form and analysis.
*Laboratory: Listening; choral; form.
Textbooks: Finney, *A History of Music;* Macpherson, *Form in Music.*

301. Instrumental Technique (0-3; 0-3)

A class in the study of brass, woodwind and stringed instruments as applied to band and orchestral groups. B.A. and B.Ed. students must study this course concurrently with Music 300.

303. Stringed Instruments (0-3; 0-3)

A class in the principles and practice of stringed instruments. This course is a requisite in the second year of the B.Mus. program.

350. (55) Elementary Harmony and Counterpoint (2-2*; 2-2*)

A. B. CRIGHTON

Strict counterpoint, combined species in three parts. Free counterpoint in three parts. Invertible counterpoint, canon and fugal exposition. Chromatic harmony in four parts. Elementary composition. Keyboard harmony.
*Laboratory: Choral; keyboard harmony; harmonic analysis.
Textbook: George Dyson, *Musicianship for Students,* Book 2.
Prerequisite: Music 45 or 250 or equivalent.

353. Elementary Orchestration (1-0; 0-1)

A. B. CRIGHTON

Scoring for various combinations of woodwind, brass and stringed instruments. Problems of instrumentation, transcription and arranging.
This course is a requisite in the second year of the B.Mus. program.
Textbook: Kennan, *The Technique of Orchestration*

400. (52) History of Music (2-2*; 2-2*)

A. B. CRIGHTON

A study of the history of music with special emphasis on the Middle Ages, Renaissance and the Twentieth Century. A weekly seminar is provided at which assigned topics are discussed.
*Laboratory: Listening; choral.
Textbooks: McKinney and Anderson, *Music in History;* Parish and Ohl, *Masterpieces of Music before* 1750.
Prerequisite: Music 51 or 300 or equivalent.

401. Instrumental Technique (0-3; 0-3)

A sequent course to Music 301. Skill is to be achieved in the playing of one instrument from each of the woodwinds, brass and strings. B.A. and B.Ed. students must study this course concurrently with Music 400.

403. Brass Instruments (0-3; 0-3)

A class in the principles and practice of brass instruments. This course is a requisite in the third year of the B.Mus. program.

405. Acoustics of Music (1-0; 1-0)

D. B. Scott

A course in acoustics illustrating the basic principles of the science of sound and designed especially for musicians. This course is a requisite in the third year of the B.Mus. program.

Textbook: Bartholomew, *Acoustics of Music.*

450. (56) Harmony, Counterpoint and Elementary Musicology (2-2*; 2-2*)

R. Stangeland

A sequent course to Music 350. The content of Music 350 (55) at a higher level. Introduction to five-part harmony and counterpoint. Writing for various instruments; setting of words; keyboard harmony; harmonic analysis, transposition and score reading; knowledge of musical works. Composition.

*Laboratory: Keyboard harmony; choral.

Additional texts: Soderlund, *Direct Approach to Counterpoint.*

Prerequisite: Music 55 or 350.

453. Advanced Orchestration (1-0; 1-0)

R. Stangeland

Scoring for the large orchestra and band. Study of selected scores. This course is a requisite in the third year of the B.Mus. program.

Textbook: Kennan, *The Technique of Orchestration.*

500. Music of the Baroque (3-0; 3-0)

A. B. Crighton

An advanced course in the study of styles, forms and literature of the Baroque Era (1600-1750).

Textbook: Bukofzer, *Music in the Baroque Era.*

503, 512 and 523 are designed for B.Mus. students and apply to their First Practical Subject. See page 79 of this calendar for details.

503. Repertory of First Practical Subject (0-1; 0-1)

Members of the Staff

The study of the piano or violin or song repertory up to and including Beethoven.

513. Repertory of First Practical Subject (0-1; 0-1)

Members of the Staff

The study of the piano or violin or song repertory of the 19th and 20th centuries.

523. Repertory of First Practical Subject (0-1; 0-1)

Members of the Staff

The study of Chamber Music and the Art Song.

FRENCH

See under Modern Languages.

GENERAL LITERATURE AND CULTURE

Instruction offered by members of the Departments of Classics and English, and by the staff of St. Stephen's College.

351. (51) Old and New Testament Literature (3-0; 3-0)

D. J. C. Elson and V. R. Wishart

A study of the historical background, authorship, sources, literary qualities, and general teaching of the various books and groups of books in the Old Testament. A sketch of Jewish literature subsequent to the Old Testament canon; the Jewish and Hellenistic environment; the occasion, authorship and content of the various books of the New Testament; the growth of the canon; the history of the text.

350. and 351. Classics in English

See Department of Classics.

350. Romance Literature

See Department of Modern Languages.

GENETICS

Instruction offered by members of the Department of Plant Science, Faculty of Agriculture, and the Department of Anatomy, Faculty of Medicine.

451. (51) Genetics (3-4*; 3-0)

J. Kuspira and J. Unrau

A survey of genetics covering the basic principles and emphasizing the relation of this science to plant and animal improvement, human inheritance and eugenics, medicine, sociology, ontogeny, and organic evolution. Classroom demonstrations. Laboratory work covers the statistical bases of commonn genotypic and phenotypic ratios; breeding experiments with Drosophila and maize, with application of genetic analyses and goodness-of-fit tests to result ing data; student projects.

Textbook: Altenburg, *Genetics*.

Prerequisite: Botany 1a, 1b or 201 or Zoology 1 or 220.

*3 hrs. lab., 1 hr. assigned projects.

462. (62) Genetics in Relation to Plant Breeding (3-0; 3-0)

W. E. Smith and J. Weijer

Application of genetic principles to plant breeding; crossing techniques; hybridization and selection methods; production and maintenance of pure seed; field plot techniques; inheritance in important crops; special exercises.

Textbook: Haynes, Immer and Smith, *Methods of Plant Breeding*.

Prerequisite: Genetics 451 (51) or 452 (52).

Advanced and Graduate Courses—

530. Microbial Genetics (0-4; 0-4)

J. WEIJER

An advanced laboratory-conference course dealing with genetics of fungi, bacteria and viruses.

Prerequisites: Genetics 451 (51) or 452 (52).

Prerequisite or corequisite: Biochemistry 300 (50) or 350 (71).

532. Human Genetics (0-0; 3-0)

MARGARET W. THOMPSON

An introductory course in human genetics, including modes of transmission of hereditary traits; interaction of heredity and environment; chromosomal anomalies; physiological genetics; mutation; and applications of human genetics in the field of medicolegal usage, heredity counselling, and eugenics.

Lectures, assignments, and seminars.

Prerequisite: Genetics 451 (51) or 452 (52).

(Additional courses in Genetics offered by the Faculty of Agriculture are available to honors students in Genetics.)

GEOGRAPHY

Professor—W. C. Wonders (Head)

Associate Professor—A. H. Laycock

Assistant Professors—J. F. Bergmann, R. W. Longley, J. G. Nelson (Calgary), P. J. Smith, B. S. Young

200. General Geography (3-0; 3-0)

W. C. WONDERS

An introductory survey course covering various aspects of the field of geography, including physical, human, and regional.

201. (1) Physical Geography (3-2; 3-2)

A systematic study of the origin, nature, and distribution of the natural environment. Land forms, weather and climate, vegetation, soils, water, and mineral resources will be related to each other in place. The laboratory work will complement the lectures and will include interpretation, study, and preparation of maps and charts.

NOTE: This is a C Division course.

300. (50) Human Geography (3-0; 3-0)

P. J. SMITH

The significance of human distribution on the earth. Man's relation to the physical environment; world population problems; cultural patterns in the world; aspects of political and economic geography in selected world trouble areas; racial geography and urban geography. Students planning on taking this course are strongly urged to precede it by Geography 1 or 201.

NOTE: This course carries senior credit as a B Division option.

301. (52) Cartography (6L; 6L)

A graphic and geometric study of the major projections and their application to cartographic purposes. The fundamentals of drafting; lettering

and type; map layout and reproduction. Identification and interpretation of land and land use features from aerial photographs and selected topographic maps.

Before registering in this course, students must obtain the consent of the instructor.

NOTE: This is a C Division course.

302. (51) Economic Geography (3-0; 3-0)

A. H. Laycock

A study of the distribution of economic activities over the world. Resources, industries, and trade patterns are reviewed systematically and in place.

400. (70) Anglo-America (3-0; 3-0)

The regional geography of Canada and the United States. The physical framework of these countries and its significance in their historical development; the concept of the geographic region, the pattern and characteristics of these regions, with selected detailed studies.

Prerequisite: A previous course in geography, or consent of instructor.

401. (73) Advanced Physical Geography (3L-0; 3L-0)

A. H. Laycock

A study of climate, vegetation, soils and landforms with stress on the water relationships of each—precipitation, evapotranspiration, stream flow, soil moisture, ground water. Water as a factor in the location of economic activities. World patterns of water supply and demand with stress on water problems in the Prairie Provinces.

Prerequisite: Geography 1 or 201 or consent of the instructor.

NOTE: This is a C Division Course.

402. (71) Northern Lands (3-0; 3-0)

W. C. Wonders

Exploration, physical and human characteristics, possibilities of development and settlement of Arctic and sub-Arctic regions. Special emphasis on Alaska, northern Canada, Greenland, and Scandinavia. A brief survey also will be made of Antarctica.

Prerequisite: A previous course in geography, or consent of instructor.

403. Weather and Climate (3L-0; 3L-0)

R. H. Longley

A systematic study of weather processes and phenomena, regional weather patterns, climatic classification and types and weather observation techniques. The laboratory work will include the interpretation of weather and climatic maps and study of local weather patterns.

Prerequisite: Geography 1 or 201 or consent of the instructor.

NOTE: This is a C Division course.

404. (72) Europe (3-1S; 3-1S)

An introduction to the physical and historical geography of Europe, followed

by the geographical characteristics of units within the continent. Seminar time will be devoted to selected detailed studies.
Prerequisite: Consent of the instructor.

406. Western Canada (3-0; 3-0)

A. H. Laycock

A study of the resources, patterns of development and regions of Western Canada. The emphasis will be upon the developed parts of the Prairie Provinces and British Columbia.
Prerequisite: One of Geography 1, 50, 51, 201, 300, 302 or consent of the instructor.
(Not offered in 1960-61).

408. U.S.S.R. (3-0; 3-0)

The regional geography of the Soviet Union.
Prerequisite: Consent of the instructor.

410. Geography in Planning (2L-1s; 2L-1s)

P. J. Smith

This course will cover selected historical, theoretical and practical aspects of land use planning in various parts of the world. Physical and cultural aspects of planning projects and problems will be considered; techniques appraised.
Prerequisite: Consent of the Instructor.

501. Air Photo Interpretation (6L; 6L)

A. H. Laycock

A study of the physical and cultural geography depicted on vertical and oblique air photos. Interpretation techniques, field use of photos and the elements of photogrammetry.
Prerequisite: One of Geography 1, 50, 52, 201, 300, 301 or consent of the instructor.

502. Reading and Seminar Course

Staff

504. Mediterranean Lands (3L-1s; 3L-1s)

A general survey of the geographical characteristics of those lands bordering the Mediterranean Sea will be followed by a series of more detailed studies for comparative purposes.
Prerequisite: Consent of the instructor.
(Not offered in 1960-61).

506. Scandinavia (3-1s; 3-1s)

W. C. Wonders

The regional geography of Norway, Sweden, Denmark, and Finland. Aspects of the historical, economic, and political geography of the area also will be included.
Prerequisite: Consent of the instructor.
(Not offered in 1960-61).

550. Research in Regional Geography

STAFF

551. Research in Physical Geography

STAFF

GEOLOGY

Professors—R. E. Folinsbee (Head), C. R. Stelck

Associate Urofessors—R. A. Burwash, H. A. K. Charlesworth, J. F. Lerbekmo, S. J. Nelson

Assistant Professors—H. Baadsgaard, F. A. Campbell, T. Oliver (Calgary), R. S. Taylor

Special Lecturer—P. S. Warren

Junior Course—

201. (1) General Geology **(3-3; 3-3)**

R. E. FOLINSBEE

Processes of destruction and reconstruction; interpretation of physiographic features with map study; stratigraphic column with index fossils from each period; common minerals and rocks.

Textbook: Holmes, *Principles of Physical Geology,* or Gilluly *et al., Principles of Geology.*

Senior Courses—

351. (51) Mineralogy **(3-3; 3-3)**

F. A. CAMPBELL

Principles of crystallography; physical and chemical properties of minerals.

Textbook: Dana, *Manual of Mineralogy* (16th ed.), revised by Hurlbut.

353. (53) Paleontology **(3-3; 3-3)**

C. R. STELCK

Principles of classification; comparison of fossil with modern forms; classification and study of fossil invertebrates, vertebrates and plants.

Textbook: Schrock and Twenhofel, *Principles of Invertebrate Paleontology.*

454. (54) Petrology **(3-3; 3-3)**

R. A. BURWASH

Introduction to petrography; optical properties of common rock-forming minerals; classification and genesis of igneous, sedimentary and metamorphic rocks; examination of rock sections.

Textbooks: To be announced.

Prerequisite: Geology 51 or 351.

455. (55) Stratigraphy **(3-3; 3-3)**

S. J. NELSON

Principles of stratigraphy; sedimentation; interpretation of geological maps; structure in stratified rocks; historical geology; index fossils.

Textbooks: Moore, *Introduction to Historical Geology* (2nd ed.); *Geology and Economic Minerals of Canada* (4th ed.)

References: Krumbein and Sloss, *Stratigraphy and Sedimentation;* Pettijohn, *Sedimentary Rocks; Principles of Stratigraphy,* Dunbar and Rodgers, *Geology and Economic Minerals of Canada,* 4th ed. (G.S.C.)
Prerequisite: Geology 53 or 353.

457. (57) Structural Geology (3-3; 3-3)

H. A. K. Charlesworth

Introduction to structural geology; primary structures; non-orogenic structures; mechanical principles involved in the deformation of rocks; description, mechanics and mapping of folds, faults, joints and secondary foliation; mechanics of intrusion; regional structural geology of the earth's crust; structural interpretation of aerial photographs; problems.
Textbook; Billings, *Structural Geology.*
Prerequisites: Geology 1 or 201 and 51 or 351.

458. (58) Mineral Deposits (3-3; 3-3)

R. E. Folinsbee

Classification, mode of occurrence and geological relations of various types of mineral deposits, including petroleum, natural gas and coal.
Textbooks: Bateman, *Formation of Mineral Deposits;* Levorsen, *Geology of Petroleum.*
Prerequisite: Geology 51 or 351.

459. (59) Geomorphology and Glacial Geology (3-3; 3-3)

R. S. Taylor

A study of land forms and the processes which create and modify them; a study of glacial features and their relation to physiographic development; map reading, field trips.
Textbooks: Thornbury, *Principles of Geomorphology;* Flint, *Glacial and Pleistocene Geology.*

461. (61) Geology of Petroleum, Natural Gas and Coal (3-0; 0-0)

R. E. Folinsbee and J. F. Lerbekmo

Classification, mode of occurrence and geological characteristics of petroleum, natural gas and coal deposits.
Textbook: Levorsen, *Geology of Petroleum.*
(Geology 461 is a half-year course. This will be taken along with Geology 464 as a Geology option in the third year of Geology pattern.)

462. (62) Photogeology (1-3; 0-0)

R. S. Taylor

The application of aerial photographs to the preparation of planimetric and geological maps.
Textbook: Smith, *Aerial Photographs.*

464. Introductory Sedimentary Petrology (0-0; 3-3)

J. F. Lerbekmo

Processes of sedimentation; weathering, transportation, deposition, diagenesis; classification and description of sedimentary rocks.

Textbooks: Pettijohn, *Sedimentary Rocks,* 2nd ed.; Folk, *Petrology of Sedimentary Rocks.*
Prerequisite or Corequisite: Geology 454.

467. (67) Field School

A ten-day field school for third year students to be held at Cranbrook, B.C., following the Spring examination period. Topographic and geologic mapping techniques; detailed mapping of the stratigraphy and of the primary and secondary structures of a small highly deformed area.

Honor and Graduate Courses—

501. (101) Advanced Structural Geology (0-0; 3-0)

H. A. K. Charlesworth

Advanced structural topics will be treated on a seminar basis.
Textbook: de Sitter, *Structural Geology.*
Prerequisite: Consent of instructor.

502. (102) Sedimentary Petrology and Sedimentation (2-0; 0-4)

J. F. Lerbekmo

Recent papers on sedimentary topics will be discussed at a weekly seminar during the first semester. Students will undertake a supervised laboratory problem in sedimentation or sedimentary petrography in the second semester.
Prerequisite: Geology 464 and consent of instructor.

503. (103) Advanced Stratigraphy (3-3; 3-3)

P. S. Warren

505. (105) Micropaleontology (6L; 6L)

C. R. Stelck

Textbooks: Jones, *Introduction to Microfossils;* Cushman, *Foraminifera.*
Prerequisites: Geology 53 and 55 or 353 and 455.

506. (106) Geochemistry (3-3; 3-3)

H. Baadsgaard

A survey of chemical processes taking place in geologic settings with emphasis on the study of the abundance relationships of the elements and nuclides in the earth's crust and the laws governing the migration and distribution of the elements in the earth.
Textbook: Mason, *Principles of Geochemistry.*
Prerequisite: Chemistry 35 or 230 or instructor's permission.

507. (107) Igeneous and Metamorphic Petrology (0-0; 3-3)

R. A. Burwash

Discussion of classic and recent papers dealing with genesis of igneous and metamorphic rocks. Laboratory study of representative suites of thin sections.
Prerequisite: Consent of instructor.

508. Precambrian Geology (3-3; 0-0)

R. A. Burwash

A study of the geological record of Precambrian time, with special reference to the Canadian Shield.
Prerequisite: Geology 455 and 458.

510. Advanced Mineralogy (6L; 6L)

F. A. CAMPBELL

A study of minerals using petrographic, mineralographic, and X-ray techniques with a view to interpretation of problems.
Prerequisites: Geology 54 or 353, Chemistry 53 or 370.

511. Regional Structural Geology (3-0; 0-0)

H. A. K. CHARLESWORTH

The geological structure of certain areas in different parts of the world will be studied on a seminar basis.
Prerequisite: Geology 57 or 457.

512. Pleistocene Geology (0-0; 3-0)

R. S. TAYLOR

Pleistocene history of both glaciated and non-glaciated areas, especially North America, Europe and the Mediterranean region. The effects of Pleistocene climatic changes on soils, biogeography and archeology.
Prerequisites: Geology 59 or 459 or instructor's permission.

513. Field Work in Geomorphology and Glacial Geology

R. S. TAYLOR

Mapping of surficial deposits and landforms of selected areas in central Alberta. One day of field work each week ($\frac{1}{2}$ year course).
Prerequisite: Geology 59 or 459 or instructor's permission.

514. Rock Analysis (1-3; 0-0) or (0-0; 1-3)

H. BAADSGAARD

The quantitative chemical analysis of silicate rocks. Problems in sampling, solution, separations and final determination of the constitutents are discussed.
Prerequisite: Chemistry 58 or 312 or instructor's permission.

609. (109) Geological Research (0-8; 0-0) or (0-0; 0-8)

MEMBERS OF THE DEPARTMENT

GERMAN

See under Modern Languages.

GREEK

See under Classics.

HISTORY

Professors—L. G. Thomas (Head), F. D. Blackley
Associate Professors—W. J. Eccles, W. D. Farnham, F. C. Heymann (Calgary), G. M. Self (Calgary)
Assistant Professors—P. de Brock,* L. Hertzman, R. H. McNeal, J. J. Malone, A. L. Murray, R. A. M. Shields (Calgary)
Staff of Affiliated Colleges—Brother Bonaventure

Junior Courses—

200. (10) European History (3-1s; 3-1s)
MEMBERS OF THE DEPARTMENT
The history of Europe from the decline of the Roman Empire in the West to the present.
(This course is also offered in St. Joseph's College.)

210. (8) Canada and the United States, 1492-1939 (3-1s; 3-1s)
L. G. THOMAS AND W. D. FARNHAM
A history of Canada and the United States, including a study of their European origins and relationships.

Senior Courses—

300. (53) Medieval Europe (3-0; 3-0)
TO BE ANNOUNCED
The rise and development of medieval institutions.

302. (74) Europe 1095-1305 (3-0; 3-0)
BROTHER BONAVENTURE
The history of Europe from the First Crusade to the residence of the Popes at Avignon, 1095-1305.
(This course is offered in St. Joseph's College as a senior B option.)
(Not offered in 1960-61).

304. (54) Europe 1453-1648 (3-0; 3-0)
TO BE ANNOUNCED
Europe in the age of the Renaissance and Reformation.

306. (71) Europe 1648-1815 (3-0; 3-0)
TO BE ANNOUNCED
European history from the Treaties of Westphalia to the Congress of Vienna.
(Not offered in 1960-61).

308. Europe since 1815 (3-0; 3-0)
TO BE ANNOUNCED

320. (77) France (3-0; 3-0)
W. J. ECCLES
The political and social development of France.

322. Germany Since 1648 (3-0; 3-0)
L. HERTZMAN

*On leave of absence.

324. (62) Russia (3-0; 3-0)

R. H. McNeal

The political and social development of Russia, with emphasis on the period since 1861.

340. (55) Social and Economic History of Europe (3-0; 3-0)

To Be Announced

(Not offered in 1960-61).

350. Britain (3-0; 3-0)

F. D. Blackley

A survey of the history of the British Isles.

352. The British Empire and Commonwealth (3-0; 3-0)

To Be Announced

A survey of the history of the British Empire and the Commonwealth.

360. (60) The United States (3-0; 3-0)

W. D. Farnham

A survey including the colonial period.

370. (58) Canada (3-0; 3-0)

W. J. Eccles and A. L. Murray

A survey of the political and social history of Canada.

380. The Far East (3-0; 3-0)

To Be Announced

(Not offered in 1960-61).

390. Latin America (3-0; 3-0)

To Be Announced

(Not offered in 1960-61).

450. (57) English Constitutional History (3-0; 3-0)

To Be Announced

Prerequisite History 350.

Honor and Graduate Courses—

500. Special Subject

Not later than the beginning of his third year the Honors student in consultation with the Department will select a special subject to be studied under the guidance of a member of the Department for the ensuing two years. He will have weekly conferences with his instructor and will be assigned written work including a minor thesis based upon primary source materials.

(1) Chaucer's England—F. D. Blackley
(2) The Reformation—P. Brock
(3) France or New France under the Old Régime—W. J. Eccles
(4) A period in the history of the American West—W. D. Farnham
(5) The transformation of Russia since 1861—R. H. McNeal
(6) The political history of the Canadian West—L. G. Thomas
(7) The history of British East Africa
(8) A period in the political history of Germany since 1648—L. Hertzman
(9) Other approved special subjects.

502. Medieval Europe (3-0; 3-0)
To Be Announced
A seminar on selected topics from the History of medieval Europe.

504. The Age of Louis XIV (3-0; 3-0)
W. J. Eccles

506. The Age of the Enlightenment (3-0; 3-0)
To Be Announced
(Not offered in 1960-61).

508. The French Revolution (3-0; 3-0)
To Be Announced

510. Europe 1815-70 (3-0; 3-0)
L. Hertzman

512. Europe since 1870 (3-0; 3-0)
L. Hertzman
A seminar on selected topics from the history of Europe since 1870.

514. The West Slavic Peoples since 1800. (3-0; 3-0)
P. Brock
(Not offered in 1960-61).

516. Russia since 1861 (3-0; 3-0)
R. H. McNeal

518. Slavonic and Soviet Studies: an interdepartmental seminar (3-0; 3-0)

520. Medieval Britain (3-0; 3-0)
F. D. Blackley
(Not offered in 1960-61).

522. England under the Tudors and Stuarts (3-0; 3-0)
To Be Announced

524. Britain in the Nineteenth Century (3-0; 3-0)
To Be Announced

526. The British Empire and Commonwealth Since 1815 (3-0; 3-0)
To Be Announced

530. Canada during the French Regime (3-0; 3-0)
W. J. Eccles

532. Canada 1763-1867 (3-0; 3-0)
To Be Announced

534. The Canadian West (3-0; 3-0)
L. G. Thomas

540. The Westward Expansion of the United States (3-0; 3-0)
W. D. Farnham

550. Latin America (3-0; 3-0)

To Be Announced

(Not offered in 1960-61).

560. The Far East (3-0; 3-0)

To Be Announced

(Not offered in 1960-61).

600. Conference Course: open to Graduate students only

Members of the Department

Directed study in special subjects to meet individual requirements.

602. (107) Philosophy of History and Historiography: open to graduate students only (3-0; 3-0)

Members of the Department

HOUSEHOLD ECONOMICS

Instruction offered by members of the School of Household Economics.

210. Foods and Nutrition (3-3; 3-3)

M. Campion

An elementary study of the composition and nutritive value of foods, with laboratory practice in food preparation, meal planning and service.

Textbook: Hughes, *Introductory Foods.*

350. (45) Applied Art (3-3; 3-3)

A study of the principles of design and the theory of color. Creative problems including block printing, stencilling, stitchery, and other techniques. Historic styles of architecture and furniture and their relation to modern design. The planning of a contemporary house and its furnishings.

Textbook: Goldstein, H. and Goldstein, V., *Art in Everyday Life.*

Note: Household Economics 210 and 350 are available as open options in the third year for students in the Faculty of Arts and Science.

LATIN

See under Classics.

MATHEMATICS

Professors—E. S. Keeping (Head), L. Moser, M. Wyman, S. M. Shah (Visiting)

Associate Professors—W. J. Bruce, G. C. Cree, D. R. Crosby, T. Fostvedt, A. A. Gibb (Calgary), G. K. Horton, R. C. Jacka, L. Lorch, H. F. J. Lowig, J. McNamee, T. V. Narayana, J. E. L. Peck (Calgary), E. Phibbs, R. O .A. Robinson, W. T. Sharp, E. L. Whitney

Assistant Professors—I. J. Davies, W. Israel, J. McGregor, J. R. Pounder, M. Takeo

Lecturers—Zennia M. Hyduk, A. S. B. Holland (Calgary)

200. (5) Elementary Mathematics (6-0; 6-0)

Members of the Department

As Mathematics 201, with the addition of plane trigonometry and solution of triangles. Additional text: Brixey and Andree, *Modern Trigonometry* (Holt). This course is intended for students who wish to have a basic course in Ma-

thematics, acceptable as a prerequisite for Mathematics 304, but who do not have Mathematics 31 of high school.
Prerequisite: Mathematics 30 of high school.

201. (1) Elementary Mathematics (3-2; 3-2)

MEMBERS OF THE DEPARTMENT

Rates of change. Differentiation and integration of simple functions. Applications. Analytic geometry of the conic sections. Exponential, logarithmic and trigonometric functions.
Textbook: Johnson and Kiokemeister, *Calculus with Analytic Geometry* (Allyn and Bacon) chapters 1 - 11.
Prerequisite: Mathematics 30 and 31 of high school.

250. (43) Theory of Finance (3-0; 3-0)

T. FOSTVEDT

Application of percent, interest, annuities certain, sinking funds and amortizations, valuation of bonds, depreciation, life annuities and life insurance.
Textbook: Stelson, *Mathematics of Finance.*
Prerequisite: Mathematics 30 of high school.

260. (46) The Nature of Mathematics (3-0; 3-0)

L. MOSER

A survey of the history, methodology, achievements and goals of mathematics, with illustrations from elementary geometry, topology, number theory, algebra and analysis.
This is a terminal course for students not intending to proceed with Mathematics. It is not an option in the Mathematics pattern.
Textbook: Richardson, *Fundamentals of Mathematics.*
Prerequisite: Mathematics 30 of high school.

270. (47) Algebra (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

Number system, induction, scales of notation. Algebra of logic and sets. Permutations and combinations, binomial and multinomial theorems. Probability. Matrices and linear transformations.
Textbook: Kemeny, Snell and Thompson, *Introduction to Finite Mathematics* (Prentice Hall, 1957).
References: Hall and Knight, *Higher Algebra* (Macmillan); Meserve, *Fundamental Concepts of Algebra* (Addison-Wesley, 1953).
Prerequisite: Mathematics 30 of high school.

***Senior Courses—**

300. (39) Calculus and Space Geometry (2-0; 2-0)

Differentiation and integration of trigonometric, exponential and logarithmic functions. Methods and applications of integration. Vectors and space geometry. Simple differential equations.

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*Mathematics students planning to enter the teaching profession in secondary schools should consult the head of the department as early as possible regarding the choice of their courses.

Prerequisite: Mathematics 1 or 5 or 200 or 201.

Textbooks: Johnson and Kiokemeister, *Calculus with Analytic Geometry* (Allyn and Bacon); Rutherford, *Vector Methods* (Oliver and Boyd).

NOTE: This is a half-course designed exclusively for students in the Geology pattern to be taken concurrently with Physics 320. It will not be accepted as equivalent to Mathematics 304.

304. (40) Calculus and Analytical Geometry **(5-0; 5-0)**

MEMBERS OF THE DEPARTMENT

Determinants. Polar and parametric coordinates. Methods and applications of integration. Series. Vectors and space geometry. Partial differentiation. Complex numbers. Multiple integrals. Elements of differential equations.

Textbook: Johnson and Kiokemeister, *Calculus with Analytic Geometry* (Allyn and Bacon).

Prerequisite: Mathematics 1 or 5 or 200 or 201.

306. Calculus, Analytical Geometry and Linear Algebra **(5-0; 5-0)**

E. L. WHITNEY

Polar and parametric coordinates. Methods and applications of integration. Series. Vectors and space geometry. Partial differentiation. Multiple integration. Complex numbers. Elements of differential equations. (These topics treated with somewhat more attention to rigour than in Mathematics 304.) Introduction to linear algebra, including matrices, determinants and vector spaces.

Pre-requisite: Mathematics 1 or 5 or 201 or 200.

Prerequisite or corequisite: Mathematics 47 or 270.

Textbooks: Johnson and Kiokemeister, *Calculus with Analytic Geometry,* (Allyn and Bacon); Murdoch, *Linear Algebra for Undergraduates,* (Wiley).

NOTE: This course is required for second year Honors students in Mathematics and Physics. Other students admitted only with the consent of the instructor.

310. (41) Elementary Mechanics **(3-0; 3-0)**

G. K. HORTON

Newton's Laws. Plane statics. Systems of forces. Centre of mass. Friction. Principle of virtual work. Thin beams. Plane kinematics and dynamics of a particle. Projectile motion. Circular motion and simple harmonic motion. The conservation laws. Stability of equilibrium. Plane motion of a rigid body. Impulsive motion.

Textbook: S. L. Green, *Advanced Level Applied Mathematics* (University Tutorial Press).

Prerequisite: Mathematics 1 or 5 or 200 or 201.

Corequisite: Mathematics 304 or 306.

320. (48) Statistical Treatment of Experimental Data **(1-0; 1-0)**

E. S. KEEPING

Errors of observation, systematic and random. Frequency distributions. The mean and standard deviation. The binomial and Poisson distributions. The Gaussian law of error. Two-variable problems—regression and correlation. Fitting of curves by least squares. Relation between sample and population. Confidence limits. Significance of experimental results.

Textbooks: J. Topping, *Errors of Observation and their Treatment* (Institute of Physics, London); D. R. Whitney, *Elements of Mathematical Statistics* (Holt).

Prerequisite: Mathematics 400 or 304 or 306.

NOTE: This is a required course in the Honors Physics program. It will be admissible in other programs only as an extra.

330. (49) Elementary Mathematics from an Advanced Viewpoint

M. WYMAN

Topics from ordinary high school algebra and geometry will be treated from the unifying point of view of more modern concepts such as function, set, group symbolic logic, the axiomatic method, and the development of a number system.

Textbook: Richardson, *Fundamentals of Mathematics* (Macmillan Co.).

Prerequisite: Mathematics 30 and 31 of High School.

NOTE: This course is designed primarily for teachers of high school mathematics.

360. (51) Geometry (3-0; 3-0)

D. R. CROSBY

Various elementary concepts of space, such as euclidean, affine, projective non-euclidean, and topological spaces; axiomatic treatment and models; relation to group theory.

Textbook: Meserve, *Fundamental Concepts of Geometry* (Addison-Wesley).

Prerequisite or corequisite: Mathematics 40 or 304, or 306.

404. (52) Advanced Calculus (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

Vector analysis. Ordinary differential equations. Series solutions of differential equations. Gamma, Bessel and Legendre functions. Fourier series. Boundary value problems.

Textbook: Gaskell, *Engineering Mathematics* (Dryden Press).

Prerequisite: Mathematics 23 or 40 or 304.

(This course is intended for third year students in Engineering. It is available to Honors Chemistry students and to students in the Mathematics and Physics patterns. It is similar to 421 and 422 but less rigorous.)

421. Differential Equations (2-0; 2-0)

Standard forms. The general linear equation. Laplace transforms. Systems of equations. Bessel and Legendre equations. Some partial differential equations. Fourier series.

Prerequisite: Math. 306 or 304 or 303.

422. Advanced Calculus (2-0; 2-0)

Series. Uniform convergence. Functions of two or more variables. Vector analysis. Line and surface integrals. Multiple integrals.

Textbook: Courant, *Differential and Integral Calculus,* Vol. II (Blackie).

Prerequisite: Math. 306 or 304 or 303.

425. Modern Algebra (2-0; 2-0)

Integral domains. Congruences. Fields. Real numbers. Polynomials. Complex numbers. Groups. Vector spaces. Matrix algebra. Linear groups.
Textbook: Birkhoff and MacLane, *A Survey of Modern Algebra* (Macmillan Co.)
Prerequisites: Math. 270 and 306 or equivalent.

430. (56) Advanced Mechanics (3-0; 3-0)

R. O. A. Robinson

Central orbits. Scattering theory. Harmonic oscillator. Normal modes of vibrations. Space motion of a rigid body. Relative motion. Tops and gyroscopes. D'Alembert's principle. Generalized coordinates. Lagrange's equations. Hamilton's principle.
Textbook: Synge and Griffith, *Principles of Mechanics* (McGraw-Hill).
Prerequisites: Mathematics 40 and 41 or 304 and 310.

460. Numerical Analysis (2-3; 2-3)

J. McNamee

Matrix methods for linear algebraic equations of moderate order. Determination of eigenvalues and eigenvectors of matrices. Solution of algebraic and transcendental equations. Interpolation, tabulation, and economization. Algebra of operators. Numerical differentiation and integration. Numerical solution of ordinary differential equations and integral equations.
References. (1) *Modern Computing Methods;* (2) *Interpolation and Allied Tables* (H.M. Stationery Office, London); Hartree, *Numerical Analysis* (Oxford University Press).
Prerequisites or corequisites: Math. 420 or 421, and Math. 425, or equivalent.

Honor and Graduate Courses—

500. (102) Theory of Functions of a Complex Variable (3-0; 3-0)

L Lorch

Complex numbers. Complex series. Functions of a complex variable. Cauchy's theorem and the calculus of residues. Integral functions. Conformal representation. The Laplace and Fourier transforms.
Textbook: Copson, *Functions of a Complex Variable* (Oxford University Press).

510. (107) Modern Algebra (3-0; 3-0)

Peano's axioms and their development. Structure theory of groups and rings. Galois theory. Valuation theory of fields. Lattice theory and Boolean algebras.
Prerequisite: Mathematics 47 or 270.

515. (110) Number Theory (3-0; 3-0)

L. Moser

Divisibility; congruences; primitive roots; quadratic reciprocity. Number-theoretic functions and the distribution of primes. Diophantine problems. Rational approximations to real numbers.

520. (103) Differential Geometry (3-0; 3-0)

Survey of classical differential geometry. Curvature of curves and surfaces. Synthetic differential geometry. Axiomatic treatment of topological and general metric spaces. Applications to non-euclidean, Riemannian, Finsler and Busemann spaces.

540. (101) Theory of Functions of a Real Variable (3-0; 3-0)

H. F. J. Lowig

Introduction to set theory. The number spstem. Real and complex numbers. Cardinal and ordinal numbers. Stieltjes integrals. Measure theory. Lebesgue integrals.

Textbook: Robin, *Principles of Mathematical Analysis* (McGraw-Hill).

Prerequisites: Mathematics 421, 422 and 425, or equivalent.

550. (104) Elementary Quantum Mechanics and Special Relativity Theory (3-0; 3-0)

The quantum principle. Principle of complementarity. Uncertainty principle. Elements of matrix mechanics. The Schrodinger wave equation. The Lorentz transformation. Relativity mechanics. Maxwell's equations.

552. Quantum Theory (2-0; 2-0)

M. Takeo

Textbooks: Moller, *Theory of Relativity;* Bohm, *Quantum Theory.*

(Offered in Calgary 1960-61).

555. (109) Hydro- and Aero-dynamics (3-0; 3-0)

Classical hydrodynamics. Kutta - Joukowski theory of airfoils. Boundary layers. Flow of a viscous fluid. Supersonic flow. Shock waves.

580. (105) Tensor Analysis (3-0; 3-0)

M. Wyman

Algebra of tensors. Covariant differentiation. Applications of tensorial methods to the geometry of curves and surfaces, analytical dynamics, elasticity, the special and general theories of relativity, and cosmology.

600. (112) Analysis (3-0; 3-0)

M. Wyman

Linear transformations. Orthogonal functions. Integral equations. Eigenvalue problems. Special functions, including Bessel, Legendre and Tchebycheff functions. Asymptotic expansions.

605. (113) Mathematical Logic (2-0; 2-0)

Sentential calculus; lower predicate calculus; Boolean algebra; structures; Goedel's completeness theorem.

610. (115) Calculus of Finite Differences (3-0; 3-0)

Introduction to the properties of difference operators, with application to the solution of linear difference equations.

615. (116) Integral Equations (3-0; 3-0)

Linear integral equations. Applications of general theory to the equations of Abel, Fredholm and Volterra.

620. (117) Conformal Mapping (3-0; 3-0)

Geometrical aspects of the theory of functions of a complex variable; mapping of simply and multiply connected domains. Univalent functions. Kernel functions. Introduction to Riemann surfaces. Applications to aero- and electro-dynamics. (Prerequisite: Math. 102 or 500).

625. (118) Analytical Number Theory (3-0; 3-0)

L. MOSER

Analytic theory of the distribution of primes. The Selberg - Erdös method. Distribution of power residues. Analytic methods in combinatorial problems and in additive number theory.

(Prerequisite: Math. 110 or 515).

630. (119) Topology (3-0; 3-0)

Combinatorial topology of surfaces; mapping and fixed point theorems; covering spaces; homology theory and Betti-groups; connectivity.

635. (108) Statistical Mechanics (3-0; 3-0)

The classical statistical mechanics of Maxwell, Boltzmann and Gibbs. The Darwin - Fowler method. Quantum statistics of Fermi - Dirac and Bose - Einstein. Specific heats. Thermal radiation. The electron theory of metals.

640. Advanced Numerical Aanlysis (3-3; 3-3)

J. MCNAMEE

Topics will be selected from problems and procedures of current interest in the field, and will include:

Inversion and determination of eigenvalues and eigenvectors for large-order matrices; approximation of functions by orthogonal sets; quadrature methods; solution of partial differential equations; stability of step-by-step methods; variational methods; linear programming; some topics from the theory of games.

Prerequisite: Mathematics 460.

Corequisite or prerequisite: Mathematics 500 or 600, or equivalent.

650. (120) Selected Topics in Theoretical Physics (3-0; 3-0)

651. Advanced Relativity Theory (2-0; 2-0)

M. WYMAN

MICROBIOLOGY

See Bacteriology

MODERN LANGUAGES*

Professor—E. J. H. Greene (Head)

Associate Professors—M. Faucher, C. H. Moore, E. Reinhold, E. von Richthofen, G. Samuel, Y. Slavutych, O. Starchuk

Assistant Professors—A. Arnold, H. Chanal, Carla Colter, A. Harms (Calgary), Germaine l'Abbé (Calgary), R. G. Motut, J. E. Oyler (Calgary), B. Plaskacz, Alison P. Scott. J. Szöverffy

*The Department's language laboratory will be used in the teaching of *all* modern languages, whether or not this is specifically stated in the Calendar under each language.

A. Romance Languages

French

Junior Courses—

100. or A. (1 or A) Beginners' French (5-0; 5-0)

French 100 is designed to enable students entering with complete matriculation but without French to begin their study of this language in the University. French A may be offered for matriculation credit only.

NOTE: Normally, students will go from French 100 to French 200.

200. (2) First Year University French (3-1; 3-1)

MEMBERS OF THE DEPARTMENT

This is an intensive course in reading modern French, French grammar and composition.

Prerequisite: Grade XII French or French 1 or 100.

Senior Courses—

Grammar, composition and oral work will be done in all senior courses. All except French 350 and French 399 will be conducted in French.

330. (53Su) French Language and Civilization (3-0; 3-0)

R. MOTUT

Pronunciation: sounds of the French language; the International Phonetic Alphabet; drill in basic speech patterns.

Grammar: a general review with emphasis on those constructions in which French usage differs from English; translation from French to English and from English to French.

Civilization: aspects of contemporary French life and letters; specimens of post-war prose and verse.

Prerequisite: French 2 or 200.

NOTE: This course, designed for teachers and prospective teachers, will *not* overlap, or serve as a substitute for, Education 280S (French section).

350. (50) Second Year French Authors and Grammar. (3-0; 3-0)

C. H. MOORE

The study of representative literary works from the Middle Ages to the present day; oral and composition work based on the texts studied. The principal authors are Villon, Ronsard, Molière, Voltaire, Baudelaire, Maupassant and Camus. An intermiedate course.

Prerequisites: French 2 or 200 or a first-class mark in French 1 or 100.

360. (51) Eighteenth Century (3-0; 3-0)

E. J. H. GREENE

A study of the literature and the evolution of ideas in the eighteenth century: Fontenelle, Marivaux, Montesquieu, Voltaire, Diderot, Rousseau, Beaumarchais.

370. (57) Romantic Period (3-0; 3-0)

CARLA COLTER

A study of the sources and history of French romanticism: Mme de Staël, Chateaubriand, Lamartine, Hugo, Musset, Vigny.

(Not offered in 1960-61).

375. (60) Realism **(3-0; 3-0)**

M. FAUCHER

This course deals with the definition and history of realism, the development of the novel: Stendhal, Mérimée, Balzac and Flaubert, and the poetry of Baudelairs.

380. (61) Prose and Poetry of the Late Nineteenth Century **(3-0; 3-0)**

C. H. MOORE

A study of naturalism in the novel and of the Parnassian and Symbolist schools of poetry.
(Not offered in 1960-61).

399. (80) Romance Philology **(3-0; 3-0)**

E. VON RICHTHOFEN

An outline of the development of Vulgar Latin into Old French and Modern French. The main differences between French and Provençal, Italian and Spanish will be shown in connection with the study of phonology, morphology and syntax in the different stages of the development.

400. (64) Seventeenth Century **(3-0; 3-0)**

M. FAUCHER

This course consists of a study of the literature and society of the seventeenth century in France. The classical theatre: Corneille, Molière, Racine; the novel; Descartes; Pascal; La Rochefoucauld and La Bruyère; La Fontaine.
Prerequisite: One senior French course.
(Not offered in 1960-61).

450. (72) Contemporary French Authors **(3-0; 3-0)**

M. FAUCHER, C. H. MOORE, E. VON RICHTHOFEN AND CARLA COLTER

Honor and Graduate Courses—

502. (102A) Practical Study of the French Language **(0-1; 0-1)**

R. MOTUT

Second year Honors laboratory hour.

503. (102B) Practical Study of the French Language **(0-1; 0-1)**

E. J. H. GREENE

Third year Honors laboratory hour.

510. (103) Seminar in French Composition **(3-0; 3-0)**

M. FAUCHER

For fourth year Honors and Graduate students. An intensive training in the preparation and oral presentation of reports in French.

550. Semantics, Lexicography and Linguistic Geography **(3-0; 3-0)**

E. VON RICHTHOFEN

580. Stylistics as applied to French Literature **(3-0; 3-0)**

E. VON RICHTHOFEN

600. (101) French Medieval Literature (3-0; 3-0)

E. von Richthofen

A study of the earliest texts; *La Vie d'Alexis; La Chanson de Roland;* Marie de France, *Les Lais; Le Miracle de Théophile; La Farce de Maistre Pierre Pathelin;* medieval lyric poetry; François Villon.

605. Chansons de geste and Romans courtois (3-0; 3-0)

E. von Richthofen

610. (107) The Renaissance (3-0; 3-0)

C. H. Moore and M. Faucher

A study of the literature of the sixteenth century, with particular attention to the works of Rabelais, Ronsard and Montaigne..

612. The Spirit of Humanism in France and England at the Beginning of the Renaissance (3-0; 3-0)

I. Sowton and C. H. Moore

614. Rabelais (3-0; 3-0)

C. H. Moore

616. Ronsard (3-0; 3-0)

C. H. Moore

618. Montaigne (3-0; 3-0)

M. Faucher

620. The French Moralists (3-0; 3-0)

M. Faucher

625. Molière (3-0; 3-0)

M. Faucher

630. The Eighteenth Century Novel (3-0; 3-0)

E. J. H. Greene

634. Marivaux (3-0; 3-0)

E. J. H. Greene

636. Voltaire (3-0; 3-0)

E. J. H. Greene and C. H. Moore

638. Rousseau (3-0; 3-0)

E. J. H. Greene

645. Stendhal (3-0; 3-0)

M. Faucher

648. Literature and the Plastic Arts from the Time of Delacroix and Baudelaire (3-0; 3-0)

M. Faucher

649. Franco-German Literary Relations during the Nineteenth Century (3-0; 3-0)

C. H. Moore

650. Maupassant (3-0; 3-0)

C. H. Moore

651. The Naturalistic Novel (3-0; 3-0)
C. H. Moore

655. The Late Nineteenth Century Theatre (3-0; 3-0)
C. H. Moore

665. Valéry (3-0; 3-0)
E. von Richthofen

670. Proust (3-0;-3-0)
M. Faucher

699. (111) Conference Course
E. J. H. Greene, M. Faucher, C. H. Moore and E. von Richthofen
An honors or graduate course designed to meet the needs of individual students. It will consist of a detailed study of some great author or literary question not dealt with in the other honors or graduate courses.

Spanish

Spanish may be begun at the University. Spanish 100 has the status of a first-year subject and is credited towards a degree.

The senior honor and graduate courses will mainly be conducted in Spanish.

Junior Courses—

100. (1) Beginners' Spanish (5-0; 5-0)
B. Plaskacz
A first course in Spanish grammar and pronunciation; an introduction to Spanish and Latin American culture.

Senior Courses—

300. (40) Second Year Spanish Authors and Grammar (3-0; 3-0)
E. von Richthofen
Spanish and Latin American authors from the late nineteenth century to our times. An intensive study of syntax and phonetics.

320. Contemporary Prose and Composition (3-0; 3-0)
B. Plaskacz
Readings and literary study of selected Spanish and South American texts; written reports on these works.
Corequisite or prerequisite: Spanish 300.

350. Spanish Literature of the Golden Age (3-0; 3-0)
E. von Richthofen
Celestina; Novela picaresca, Cronistas de Indias, *Araucana,* Romancero, Libros de Caballerìas, *Quijote.*
Prerequisite: Spanish 40 or 300.

370. Spanish Drama and Lyric Poetry to 1850 (3-0; 3-0)
E. von Richthofen
Their development from the early stages to the Romantic period studied in the main texts.
Prerequisite: Spanish 40 or 300.
(Not offered in 1960-61).

Honors and Graduate Courses—

502. Practical Study of the Spanish Language (0-1; 0-1)
Second year honors laboratory hour.

503. Practical Study of the Spanish Language (0-1; 0-1)
Third year honors laboratory hour.

504. Practical Study of the Spanish Language (0-1; 0-1)
E. von Richthofen
Fourth year honors laboratory hour.

540. History of the Spanish Language (3-0; 3-0)
B. Plaskacz

602. The Poem of the Cid. (3-0; 3-0)
E. von Richthofen

605. Early Spanish Prose (3-0; 3-0)
E. von Richthofen

665. Contemporary Spanish Poetry (3-0; 3-0)
E. von Richthofen

670. Modern Spanish and Latin American Novelists (3-0; 3-0)
E. von Richthofen

Romance Literature in English Translation

350. (50)Romance Literature (3-0; 3-0)
E. von Richthofen
A survey of heroic and courtly epics in France and Spain, Provençal troubadour lyrics, Dante, Petrarch, Boccaccio, Ariosto, Cervantes, Lope de Vega, Calderón.

B. German

This language may be begun at the University. German 100 is designed to enable students entering with complete matriculation but without German to begin the language in the University. German A may be offered for matriculation credit only. German 100 has the status of a first year subject and is credited towards a degree. Students from German 100 normally pass on to German 300, but the Department may require registration in German 200.

Students entering the University with German 30 of the High School will normally be registered in German 200 and proceed to German 350 or 370.

Students entering the University with preparation in German other than German 30 of the High School should consult with the Department regarding the assessment of their standing.

All senior, honor and graduate courses from German 370 on will be conducted in German.

For honors courses in German see *Degrees with Honors.*

100. or A. (1(a) or A) Beginners' German (3-2; 4-1)
E. Reinhold
This course is designed to impart, on the introductory level, an active, practical skill in the use of the spoken and written word. The oral approach will be stressed, using material from everyday-life situations, easy cultural readers,

slides, charts, maps, etc. The Department's language laboratory will be used for drill purposes and will also be available to students for individual practice.

210. (1(b)) Scientific German (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

This course will cover the elements of German grammar. It aims to give students a reading knowledge of easy scientific German. It is especially designed to meet the needs of honors students from science departments, students of the professional faculties and graduate students who require a knowledge of scientific German.

Students in these categories will be given credit in this course, but are strongly recommended to take the sequent course, German 310, in which advanced scientific texts are read.

200. (2) First Year University German (3-1; 3-1)

ALISON P. SCOTT

This course is devoted to the development of the student's ability in speaking, reading and writing German, using modern short stories, cultural readers and visual aids.

The Department's language laboratory will be used for drill and practice

Prerequisite: Matriculation German or its equivalent.

300. (40(a)) Intermediate German (3-0; 3-0)

ALISON P. SCOTT

This course aims at a high level of accomplishment in German pronunciation, composition and conversation. It will include grammar review and expansion, practice in the spoken language, written exercises and, through the texts selected, an introduction to the literature and culture of Germany.

The course is not open to students with credit or registered in German 2 or 200.

310. (40(b)) Advanced Scientific German (3-0; 3-0)

ALISON P. SCOTT

Reading of advanced scientific and technical texts, supplemented by a systematic and thorough discussion of grammatical difficulties and "trouble makers" in German scientific literature. The use of the dictionary. Analyzing compound words into their component parts. Technical terms. Abbreviations, reading of general texts and articles from major fields of science.

Students who pass German 310 with a mark of 65% or better will be considered by the Department as having fulfilled the reading requirement in German for the Ph.D.

Prerequisite: German 210 or 1(b) or 100 or 1(a), or their equivalent.

350. Survey of German Literature (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

A general survey, a study of selected periods and of major works of German literature. A review of grammar, oral and composition work.

Prerequisites: German 2 or 200 or the consent of the Department.

370. (54)German Literature of the Eighteenth Century **(3-0; 3-0)**

ALISON P. SCOTT

A study of the historical and cultural background of the eighteenth century, of Rationalism, *Sturm und Drang*, Classicism, and the beginnings of Romanticism. Foreign influences on German literature. Lectures, discussions and reports will be based on selected works of Lessing, Goethe and Schiller.

Prerequisite: German 2 or 200, or 40(a) or 300.

400. (57) German Literature of the Nineteenth Century **(3-0; 3-0)**

A. ARNOLD

This course consists of a study of the leading exponents of nineteenth century drama, fiction and poetry, including the background of Romanticism, of the Young Germany Movement, of Realism, and of Naturalism. A careful study is made of the characteristic qualities of the writers and their contributions to German literature. Lectures, discussions and individual reports.

Prerequisites: German 54 or 370, or German 40(a) or 300 subject to the approval of the Department.

(Not offered in 1960-61).

450. (72) Modern German Literature **(3-0; 3-0)**

A. ARNOLD

The purpose of this course is to trace the important literary movements since Naturalism, using a number of representative authors of each period. Reading and interpretation of outstanding dramas, novels, short stories and poems. Lectures, discussions and individual reports.

Prerequisites: German 54 or 370, or German 40 or 300 subject to the approval of the Department.

Honor and Graduate Courses—

Before registering for these courses, students must consult the Department to ensure that they are qualified to undertake the work.

500. Special Reading Course **(3-0; 3-0)**

J. SZÖVERFFY

Specifically designed for graduate students who wish to prepare themselves for the Ph.D. language requirement in German. The course consists of an intensive study of essential grammar, reading of graded texts and translation of texts selected from the students' own fields. Conducted on a tutorial basis.

Graduates who obtain a mark of 65% or better will be considered by the Department as having fulfilled the reading requirement in German for the Ph.D.

Not open to undergraduates.

502. (105A) Practical Study of the German Language **(0-1; 0-1)**

ALISON P. SCOTT

Second year honors laboratory hour.

503. (105B) Practical Study of the German Language **(0-1; 0-1)**

A. ARNOLD

Third year honors laboratory hour.

504. (105C) Practical Study of the German Language (0-1; 0-1)

E. Reinhold

Fourth year honors laboratory hour.

510. (107) Advanced German Composition and Conversation (2-0; 2-0)

A. Arnold

This course is designed to enable students to read the German language fluently and intelligently, to write it correctly and idiomatically, to understand it as a spoken language and to speak it with facility. The work consists of conversation and exercises in composition relating to topics of general interest; reading of difficult literary material; discussion of problems of German grammar; drill in pronunciation and intonation; building of the German vocabulary.

Required of all students taking honors and majoring in German.

530. (101) German Medieval Literature and Philology (3-0; 3-0)

J. Szöverffy

Prerequisites: Two senior German courses.

540. (103) Old High German Philology and Literature (3-0; 3-0)

J. Szöverffy

Prerequisite: One senior German course.

***550. Gothic** (3-0; 3-0)

J. Szöverffy

***560. History of the German Language** (3-0; 3-0)

J. Szöverffy

***570. Survey of Germanic Philology** (3-0; 3-0)

J. Szöverffy

***600. An Introduction to the Study of Lyric Poetry: Goethe's Poems** (3-0; 3-0)

E. Reinhold

***603. German Poetry from the Twelfth to the Nineteenth Century** (3-0; 3-0)

Alison P. Scott

***606. The Development of the German Drama** (3-0; 3-0)

E. Reinhold

***609. Development of the German Novelle with Emphasis on the Nineteenth Century** (3-0; 3-0)

E. Reinhold

***612. The German Roman from Johann Fischart to Jakob Wassermann** (3-0; 3-0)

A. Arnold

***615. History of German Literature to the Age of Goethe** (3-0; 3-0)

Alison P. Scott

***630. Lessing and the Period of Enlightenment** (3-0; 3-0)
ALISON P. SCOTT

***640. Goethe's Faust and the Faust Legend** (3-0; 3-0)
E. REINHOLD

***650. Schiller's Historical Dramas** (3-0; 3-0)
ALISON P. SCOTT

***660. Heinrich Heine and the Young Germany Movement** (3-0; 3-0)
A. ARNOLD

***670. The German Drama of the Nineteenth Century** (3-0; 3-0)
E. REINHOLD

***680. The Life and Works of Gerhart Hauptmann** (3-0; 3-0)
E. REINHOLD

***690. Contemporary German Poetry** (3-0; 3-0)
A. ARNOLD

695. Anglo-German Literary Relations from the Sixteenth to the Nineteenth Century. (3-0; 3-0)
E. REINHOLD

699. Conference Course
MEMBERS OF THE DEPARTMENT
An honors or graduate course designed to meet the needs of individual students. It may include the detailed study of an author, period, genre, or any literary problem not dealt with in the honors or graduate courses listed above.

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*These courses were formerly given as German 115, Seminar Courses (Literature and Philology).

C. Slavonic Languages

Russian

Russian may be begun at the University. Russian 100 has the status of a first-year subject and is credited towards a degree.

Junior Courses—

100. (1(a)) Beginners' Russian (Arts Section) (5-0; 5-0)
H. CHANAL
This course is elementary and is designed to give a working knowledge of the Russian language. It provides a study of the essentials of grammar, reading, and drill on useful expressions.

210. (1(b)) Beginners' Russian (Science Section) (3-0; 3-0)
H. CHANAL
This course is designed to meet the needs of honor students in the science departments, students of the Faculties of Engineering, Agriculture, Dentistry, Medicine and Graduate Studies of any year who require a reading knowledge of Russian scientific literature. Students will be given credit in this course but are recommended to take the sequent course, Rissian 310, in which advanced scientific texts are read.

Senior Courses—

300. (40(a)) Second Year Russian (Arts Section (3-0; 3-0)

O. STARCHUK

Advanced Russian grammar, composition, and oral practice based on selected texts of Russian classical and contemporary literature.
Prerequisite: Russian 1(a) or 100.

310. Second Year Russian (Science Section) (3-0; 3-0)

B. PLASKACZ

This course is a continuation of Russian 210. Russian scientific articles of current interest will be provided, discussed and translated. The course will give students a sufficient command of the language to enable them to translate advanced Russian texts in their fields of study.

320. Selected Prose, Poetry and Drama of the Nineteenth Century (3-0; 3-0)

TO BE ANNOUNCED

Reading and literary study of one major classical novel, one play by Chekhov, and selected poems. Composition based on these works.
Corequisite: Russian 300.

350. Russian Literature in English (3-0; 3-0)

D. H. STEWART

A study of major Russian authors in the 19th and 20th centuries with special emphasis on the psychological and social significance of their works in the large context of general Russian cultural evolution. This course is designed for students who are interested in comparing Russian literature with other major literatures and as a general option.
Not open to honors students in Russian.

360. (51) Survey of the History of the Eastern Slavonic and Russian Literatures (3-0; 3-0)

O. STARCHUK

Oral literature, the first writings, literature from the epic *Tale of Igor's Expedition* of the Twelfth Century up to and including Classicism, Romanticism, Realism and the influence of the Naturalistic School. Social and political background.
Advanced Russian grammar, conversation and composition.
Reading of the texts of the Nineteenth Century, with composition based on short stories by Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Chekhov and L. N. Tolstoy.
Prerequisite: One senior Russian course.

380. (115d) Russian Drama (3-0; 3-0)

O. STARCHUK

History of the Russian Drama and a critical reading of five classics: Krylov's *The Lesson to the Daughters* (Urok dochkam), Griboyedov's *Woe from Wit* (Gore ot uma), A. N. Ostrovsky's *The Thunderstorm* (Groza), Gogol's

The Inspector General (Revisor) and Chekhov s *The Cherry Orchard* (Vishnëvyi sad).
Prerequisite: One senior Russian course.

400. Russian Literature of the Late Nineteenth and Early Twentieth Centuries (3-0; 3-0)
O. Starchuk
This course will cover the new literary movements of the period (the religious philosophers, mystical revolutionism, the aesthetic revival and the symbolists, socialist messianism) up to and including the principles of Socialist Realism of Soviet literature, with particular attention to the works of L. N. Tolstoy, Merezhkovsky, Ivanov, Blok, Bely, Balmont, Sologub, Remizov, Gumilëv, Mayakovsky and others.
Prerequisites: Two senior courses in Russian.

Honor and Graduate Courses—

502. (102A) Practical Study of the Russian Language (0-1; 0-1)
H. Chanal
Second year Honors laboratory hour.

503. (102B) Practical Study of the Russian Language (0-1; 0-1)
H. Chanal
Third year Honors laboratory hour.

504. (102C) Practical Study of the Russian Language (0-1; 0-1)
H. Chanal
Fourth year Honors laboratory hour.

540. (115a) Introduction to Comparative Slavonic Philology (3-0; 3-0)
To Be Announced

600. Early Eastern Slavonic Literature (3-0; 3-0)
O. Starchuk

640. (115c) Russian Poetry of the Eighteenth and Nineteenth Centuries (3-0; 3-0)
O. Starchuk

660. (115i) The Russian Psychological Novel (3-0; 3-0)
O. Starchuk

670. Soviet Russian Literature (3-0; 3-0)
O. Starchuk

699. Conference Course
Members of the Department
This is an honors or graduate course to meet the needs of individual students. It will consist of a detailed study of some great author or literary problem, directed reading and discussion. Courses offered: Pushkin, Lermontov, Gogol, Turgenev, Nekrasov, Dostoevsky, L. N. Tolstoy, Chekhov, Gorky. With the permission of the Department, any other suitable subject may be studied in this course.

Ukrainian

Ukrainian may be begun at the University. Ukrainian 100 has the status of a first-year course and is credited towards a degree.*

*In the Faculty of Arts and Science credit towards a degree is given only in the honors program in Modern Languages and in the Foreign Languages pattern. Students in the honors program may take Ukrainian as a second Slavonic language but students in the Foreign Languages pattern are restricted to one Slavonic language and may not present Ukrainian if they present Russian.

Junior Course—

100. Beginners' Ukrainian (5-0; 5-0)

This course is elementary and is designed to give a working knowledge of the Ukrainian language. It provides a study of the essentials of grammar, reading and drill on useful expressions.

Senior Course—

300. Second Year Ukrainian (3-0; 3-0)

Advanced Ukrainian grammar, composition, and oral practice based on selected texts of Ukrainian classical and contemporary literature.
Prerequisite: Ukrainian 100 or the instructor's consent.

360. Survey of the History of Ukrainian Literature since the Eighteenth Century (3-0; 3-0)

To Be Announced

Historical survey of Ukrainian literature from Kotliarevsky to the present. Cultural background, literary works and major writers. Reading of selected texts, with composition based on short stories. Advanced elements of Ukrainian language.
Prerequisite: Ukrainian 300.
(Not offered in 1960-61).

D. Linguistics

400. (105) General Linguistics (3-0; 3-0)

E. Reinhold

An introduction to and a survey of the field of language and languages dealing with the fundamentals of structural and historical linguistics. Topics discussed include language families, types of languages, linguistic change, linguistic structure. Emphasis will be placed on modern European languages. Required of students reading for Honors in Modern Languages or French and Latin.

MUSIC

See under Fine Arts.

PATHOLOGY

Instruction offered by members of the Department of Pathology, Faculty of Medicine.

361. (61) Clinical Pathology (1-2; 1-2)

A course in Clinical Pathology designed for students in the Special B.Sc. pattern. The lectures will be on the use and interpretation of laboratory

methods as diagnostic aids. The laboratory periods will be designed to develop in the students a high degree of accuracy and reasonable speed in hemotological and other clinical pathological procedures that are used in a modern hospital laboratory.

PHILOSOPHY AND SOCIOLOGY

Professors—A. M. Mardiros (Head)
Associate Professors—G. K. Hirabayashi, R. L. James, T. M. Penelhum
Assistant Professors—C. L. French, J. W. Heintz (Calgary), J. A. Hostetler, J. F. Lambert, R. Laskin, E. H. McCannell, P. Radcliff, H. Zentner (Calgary)
Staff of Affiliated Colleges—Brother Anselm

Philosophy

Junior Courses—

240. (40) Introduction to Western Philosophy (3-0; 3-0)

This course is designed to introduce the student to the main problems and theories that have dominated philosophical thought in the Western world, through the study and discussion of selected philosophical classics. Emphasis will be placed both upon a sound acquaintance with the main outlines of our philosophical tradition and upon the ability to handle philosophical ideas independently. To this end both lectures and discussions will form part of the student's training.

Reading will be selected from the following: Plato, *Republic;* Aristotle, *Ethics;* Lucretius, *De Rerum Natura;* Fremantle (ed.), *The Age of Belief;* Descartes, *Meditations;* Burtt (ed.), *The English Philosophers from Bacon to Mill.*

246. (44) The Philosophy of Aquinas (3-0; 3-0)

Brother Anselm

A critical survey of the chief philosophical theories of Aquinas: theory of knowledge, the nature of reality, the existence and nature of God, the nature of man, and theory of education. Contemporary Thomism.

(This course is offered in St. Joseph's College for Roman Catholic Students It is also available to Roman Catholic students in Education as a prerequisite for Ed. Phil. 492.)

260. Introduction to Logic and the Theory of Knowledge (3-0; 3-0)

This course introduces the student to the various types of rational argument and proof, and subsequently undertakes an elementary examination of theories of meaning and truth. Its general purpose is to show how to distinguish between sound and unsound beliefs and thus to serve as an introduction to philosophical method.

(Not offered in 1960-61).

Senior Courses—

340. (59) Greek Philosophy (3-0; 3-0)

(Not offered in 1960-61).

342. (58) Modern Philosophy (3-0; 3-0)

Prerequisite: Phil. 40 or 240.

(Not offered in 1960-61).

344. (53) Contemporary Philosophy **(3-0; 3-0)**

T. M. PENELHUM

A discussion of the main currents of present-day philosophical thought.
Prerequisite: Philosophy 40 or 240.

350. (60) Aesthetics **(3-0; 3-0)**

A. M. MARDIROS

An inquiry into the nature and justification of standards of art and beauty.

352. (52) Social Philosophy **(3-0; 3-0)**

A. M. MARDIROS

A philosophical and synoptic study of the nature of society.

354. (54) Ethics **(3-0; 3-0)**

A. M. MARDIROS

An inquiry into the nature and justification of moral standards.

356. (56) The Moral Philosophy of Aquinas **(3-0; 3-0)**

BROTHER ANSELM

Ethical theories and problems as discussed by Aquinas, and their application to contemporary ethical and social situations.
(This course is offered in St. Joseph's College and is accepted as a senior credit for Roman Catholic students. It is also available to Roman Catholic students as a prerequisite to Ed. Phil. 492.)

358. (55) Philosophy of Religion **(3-0; 3-0)**

T. M. PENELHUM

A philosophical examination of the fundamental concepts of religious thinking.
Prerequisite: A previous course in philosophy, or consent of instructor.

360. (61) Logic **(3-0; 3-0)**

J. F. LAMBERT

An inquiry into the standards and principles of reasoning.
Prerequisite: A previous course in Philosophy, or consent of instructor.

462. (62) Philosophy of Science **(3-0; 3-0)**

J. F. LAMBERT

An enquiry into the methods and techniques of science.
Prerequisite: Philosophy 61 or 360 or consent of instructor.

Honor and Graduate Courses— **(3-0; 3-0)**

Candidates for honors will arrange their course in consultation with the head of the department.

540. (110) Ancient Philosophy
542. (102) Modern Philosophy (Advanced Course)
544. (108) History of Philosophical and Scientific Thought
546. (111) Mediaeval Philosophy
548. (109) Conference Course
550. (105) Aesthetics (Advanced Course)
554. (104) Theory of Value

558. (107) The Philosophy of Religion

560. (103) Logic (Advanced Course)

564. (106) Metaphysics

566. (112) Theory of Knowledge

568. (113) Philosophy of Mind

Sociology

Junior Course—

202. (40) Introductory Sociology (3-0; 3-0)

The sociological study of society, social institutions, group behavior, personality formation and social change.

Senior Courses—

302. Cultural Anthropology (3-0; 3-0)

A study of the evolution of prehistoric cultures in the old and new world; the organization of the life and thought of primitive peoples as evidenced in family, clan, and political relationships, economic practices, religion, art, mythology, folklore and social customs.

310. Social Science Research Methods (3-2; 3-2)

Study and application of the various research techniques used in sociology and related social sciences, with special emphasis on interviewing, questionnaires, attitude scales, sociometric testing, survey and sampling.
Prerequisite: Consent of Instructor.

320. (54) Social Problems (3-0; 3-0)

The analysis of social and personal disorganization in relation to social change, culture conflict and value systems.

326. (55) Criminology and Penology (3-3; 3-0)

A critical examination of the causes of crime and juvenile delinquency, with an analysis of the social processes leading to criminal behavior; the evolution and evaluation of theories of punishment, the law and the courts, penal and reformatory institutions, probation and parole. A consideration of the various experiments in reform and rehabilitation.

340. Social Psychology (3-0; 3-0)

A study of the emergence of personality in various social interaction situations; analysis of the relationship of individual and social group. Consideration of the forces underlying the development of the social order with special attention given to crowds, mobs, panics, manias, cults, fashions, fads, social ideologies, social movements, and other forms of mass behavior.
Prerequisite: Psychology 40 or 202 or Sociology 40 or 202 or equivalent.

350. Population and Human Ecology (3-0; 3-0)

A study of population and its composition, with special reference to trends in Canada. Class, occupational, and rural-urban differences with respect to population changes. The problem of human migration. The second half of this course focuses on the ecological processes and patterns related to the distribution of population.

360. Social Class in Modern Society (3-0; 3-0)

An analysis of social stratification in western society, with reference to the effects of industrialization, and including comparative analysis of primitive societies. Special attention given to the basis of stratification, the structure and function of social class systems, social mobility, and the special classes in modern society, such as the "managerial class", labor, and "power eliite", etc.
(Not offered in 1960-61).

370. (56) The Family (3-0; 3-0)

Structure and function of the family, comparative family systems, sociology of family life stages (such as childhood, adolescence, adulthood, old age), contemporary trends and problems of the family.

380. (60) Minority and Ethnic Group Relations (3-0; 3-0)

A study of the problems arising from racial and minority status. An analysis of the sources of prejudice, current theories of race and culture, and the effect of interracial and minority group contacts. An examination of critical situations requiring adjustment and social treatment.
(Not offered in 1960-61).

450. (50) The Human Community (3-0; 3-0)

Rural and urban communities: their institutional structure, ecological factors associated with patterns of growth, community relations, community planning.
Prerequisite: A first course in sociology.
(Not offered in 1960-61).

460. (53) Social Organization (3-0; 3-0)

Theories of social organization, analysis of such forms of social organization as kinship groups, bureaucracy, economic system, science, etc., and their interrelationship in functioning social systems.
Prerequisite: A first course in sociology.

Honor and Graduate Courses—

502. Conference Course in Sociology for Honors and Graduate Students (3-3; 3-3)

Arranged for various topics of sociology on the basis of special interest and need. Consent of instructor required.

510. (101) Theoretical Sociology and Social Research (3-3; 3-3)

Contemporary theoretical sociology, with emphasis on developing testable hypotheses and applying social research techniques, such as questionnaires, interviews, attitude scales, sociometric techniques, surveys and experiments.
Prerequisite: Sociology 40 or 202 or equivalent.

520. Seminar in Industrial Sociology (3-0; 3-0)

Analysis of selected aspects of industrial situations as they relate to the work group and its place in the industrial complex.

530. (100) History of Sociological Thought (3-0; 3-0)

The historical roots of sociology, beginnings of modern sociology, and development of sociological theory.

Prerequisite: Sociology 40 or 202 or equivalent.

540. Seminar in Social Psychology (3-0; 3-0)

Special problems in social psychology for students with an interest in social psychology, and a strong background in psychology.

542. (103) Small Group Behaviour (3-2; 3-2)

Analysis of small groups in terms of formal and informal organization, group dynamics, role-playing, problem-solving, etc. Field study and research.

Prerequisite: Sociology 40 or 202 or equqivalent.

SPANISH

See under Modern Languages.

PHYSICAL EDUCATION

Instruction offered by members of the School of Physical Education.

Phys. Ed. 218. (1M) Recreational Activities (0-2; 0-2)

C. J. Drake and Staff

Emphasis on the fundamentals of the following recreational activities: touch football, Bordenball, volleyball, badminton, basketball, tumbling, aquatics and golf.

Course required of all first-year men.

Phys. Ed. 228. (2W) Recreational Activities (0-2; 0-2)

R. Anderson and Staff

Emphasis on the fundamentals of the following recreational activities: tennis, aquatics, badminton, volleyball, basketball, social dancing and golf.

Course required of all first-year women.

PHYSICAL SCIENCE

Instruction offered by members of the Department of Physics.

341. (41) Physical Science (3-0; 3-0)

H. Grayson-Smith

A course designed for B.A. and B.Ed. students to give them some appreciation of fundamental ideas and methods in the physical sciences, of modern trends in this field, and of its relation to other disciplines. Illustrative material will be taken from Physics, Chemistry, Astonomy and Geology, and the history and development of the subject will be stressed.

Textbook: Wistar, *Man and His Physical Universe.*

Note: This course is not open to first year students, and may not be taken for credit by students who have already taken Physics 1 or 36 or 100 or 200.

PHYSICS

Professors—H. Grayson-Smith (Head), A. B. Bhatia, G. D. Garland, K. B. Newbound, D. B. Scott

Associate Professors—C. E. Challice (Calgary), J. H. Harrold, H. Schiff, L. E. H. Trainor, B. G. Wilson (Calgary), S. B. Woods

Assistant Professors—D. D. Betts, H. A. Buckmaster (Calgary), G. L. Cumming, W. K. Dawson, J. Lipson, F. D. Manchester, G. C. Neilson, J. T. Sample, F. Terentiuk (Calgary), D. Venkatesan (Calgary), K. Vozoff, F. L. Weichman

A. General Elementary Physics (3-2; 3-2)

An introductory course on the basic principles of physics, illustrated by experiments.

For all students who require matriculation credit in Physics 30 of Grade XII. This course does not carry University credit.

Textbook: Burton, Grayson-Smith and Quinlan, *College Physics.*

NOTE:—

1. Four alternative junior courses are offered, not more than one of which may normally be taken. Physics 100 is designed for students who lack Physics of Grade XII. Physics 200, 240 and 242 require Physics 30 of Grade XII as a prerequisite. Physics 200 is for students who require a University course in General Physics. Physics 240 is for students who are taking Mathematics concurrently, and who expect to take senior courses in Physics. Physics 242 is for students in the pre-honors programs in Physics, Physics and Geology, Mathematics.
2. Mathematics 201 or equivalent is prerequisite to all senior courses in Physics.

100. (1) General Elementary Physics (3-2; 3-2)

K. VOZOFF

Textbook: Burton, Grayson-Smith and Quinlan, *College Physics.*

200. (36 or 41) General Physics (3-2; 3-2)

J. H. HARROLD AND G. L. CUMMING

A general course in the fundamentals of physics, including mechanics, properties of matter, heat, sound, electricity and light. Illustrated by experiments.

Textbook: Shortley and Williams, *College Physics.*

240. (35 or 40) Physical Properties of Matter, Heat and Sound (3-2; 3-2)

K. B. NEWBOUND AND J. I. LIPSON

Mechanics, Properties of matter, heat, wave-motion and sound. Illustrated by experiments.

Textbook: Semat and Katz, *Physics.*

Reference books: Mendenhall, Eve, Keys, and Sutton, *College Physics;* Edser, *Heat for Advanced Students;* Lemon and Ference, *Analytical Experimental Physics.*

Corequisite: Mathematics 201.

242. Physical Properties of Matter, Heat and Sound (3-2; 3-2)

G. D. GARLAND

This course covers the same topics as Physics 240, but with a more analytical approach, suitable for Honors students.

Textbook: Lemon, Ference, and Stephenson, *Analytical Experimental Physics,* (Revised Edition).

Corequisite: Mathematics 201.

NOTE: This course is required for pre-honors students in Physics, Physics and Geology, Mathematics. Other students may be admitted by permission of the instructor.

320. (44) Electricity and Magnetism (2-1; 2-1)

A half course designed to be taken concurrently with Mathematics 300. Direct current circuits, electrostatics and elementary potential theory, magnetic fields, electromagnetism, alternating currents, introduction to electronics. The lectures will be accompanied by a problem period in the first term, and by a laboratory in the second term.

Textbook: Nelkon, *Electricity and Magnetism.*

Corequisite: Mathematics 300.

Prerequisites: Mathematics 1 or 2 or 5 or 200 or 201, Physics 35 or 36 or 40 or 41 or 200 or 240.

340. (43) Light, Electricity and Magnetism (3-3/2; 3-3/2)

MEMBERS OF THE DEPARTMENT

A course designed to follow Physics 240 (old 35) and to give a foundation in physics suitable for work in other physical sciences. Propagation of light, lenses and optical instruments, photometry, interference and diffraction. Electrostatics, potential capacitors, D.C. circuits, magnetism and magnetic field, electromagnetism, induced E.M.F.., self-inductance, introduction to alternating currents.

Textbook: Sears and Zemansky, *University Physics,* Part II.

Prerequisites: Physics 21 or 35 or 40 or 238 or 240 or 242, Mathematics 1 or 2 or 5 or 200 or 201 or 202.

360. (42) Optics and Mechanics (3-2; 3-2)

L. E. H. TRAINOR

First Term: Geometrical and physical optics and wave motion.

Second Term: Foundations of mechanics: Motions of particles and systems of particles; motion in a central field.

Textbooks: Robertson, *Introduction to Optics;* Lindsay, *Physical Mechanics.*

Prerequisites: Physics 238 or 240 or 242, Mathematics 201 or 202.

380. (46) Magnetism and Electricity (3-2; 3-2)

D. B. SCOTT

Electrostatics and magnetostatics; field and potential theory; D.C. circuits and instruments; chemical and thermal E.M.F.; properties of dielectrics and capacitance; electromagnetics; induced E.M.F.; inductance; magnetic properties of matter and ferromagnetism; A.C. circuits.

Textbook: Duckworth, *Electricity and Magnetism.*

Reference books: Leob, *Fundamentals of Electricity and Magnetism;* Gilbert, *Electricity and Magnetism;* Curtis, *Electrical Measurements.*

Prerequisites: Physics 21 or 35 or 40 or 238 or 240 or 242, Mathematics 1 or 2 or 5 or 200 or 201 or 202.

NOTE: Physics 340 and 380 are alternative courses, only one of which may be taken.

400. (50) The Development of Modern Physics (3-0; 3-0)

J. H. HARROLD

A study of modern physics, emphasizing the development of current theoretical concepts and modern experimental methods. Topics will include: kinetic theory of matter; electrical conduction, electrons and electron tubes; electrical and neutral particles; radiation and quantum theory; radio-activity and nuclear atomic energy; cosmic rays; relativity.

Textbook: Blanchard et al., *Modern Physics.*

Reference Books: Blackwood, Osgood, Ruark, *Outline of Atomic Physics.*

Prerequisites: Physics 200 or 240 and 340, or 240 and 380; Mathematics 1 or 2 or 5 or 200 or 201.

420. (59) Introduction to Physics of the Earth (3-3; 3-3)

K. VOZOFF AND G. L. CUMMING

A course designed to follow Physics 320 (old 44) and introduce physical methods of studying earth structures. Principles of elasticity and gravitation. Physical properties of the earth as indicated by earthquake waves, gravity, electrical and magnetic measurements. Heat flow in the earth's crust, radio-activity of rocks.

Prerequisites: Physics 44 or 203, Mathematics 39 or 300.

Reference Books: Dobrin, *Introduction to Geophysical Exploration,* 2nd Ed.; Jacobs, Russell, and Wilson, *Physics and Geology.*

440. (56) Electronics (2-3; 2-3)

G. C. NEILSON

Characteristics of electron tubes; resonant and coupled circuits; equivalent circuits; amplifiers; oscillators; modulation and detection; electronic measuring instruments; wave shaping circuits; the superheterodyne radio receiver.

Prerequisite: Mathematics 40 or 304 and Physics 43 or 46 or 340 or 380.

Textbooks: Ryder, *Electronic Fundamentals and Applications;* Millman and Taub, *Pulse and Digital Circuits.*

Reference books: M.I.T. Staff, *Applied Electronics;* Millman and Seely, *Electronics;* Zworykin and Morton, *Television;* Seely, *Electron-tube Circuits;* Ryder, *Networks, Lines and Fields.*

470. (54) Molecular, Atomic and Nuclear Physics (3-0; 3-0)

K. B. NEWBOUND

Electrons, photons and their interactions; restricted relativity theory; introductory wave mechanics; structure and spectra of atoms and molecules; X-rays and crystal structures: radioactivity and nuclear structure. For honors students and senior students in Arts and Science, and students in Engineering Physics.

Prerequisite: Physics 46 or 380.

Prerequiste or corequisite: Mathematics 57 or 420.

Textbook: Yarwood, *Atomic Physics.*

Reference Books: Richtmeyer, Kennard and Lauritsen, *Atomic Physics;* French; Born; Tolansky; Finkelenburg; Experimental methods — Hoag and Korff; Fretter; Electrons and photons — Spring; Relativity — McCrea; Wave mechanics — Heitler, Mott; X-rays — Lonsdale; Nuclear physics — Halliday; Huntley; Evans.

471. (55a) Advanced Laboratory **(0-3; 0-3)**

480. (53) Electromagnetism **(3-3; 3-3)**

F. D. Manchester

Description of electrostatic and electromagnetic fields using vector methods; potential theory; Maxwell's equations, electromagnetic waves and guided waves; electrical measurements; some selected topics in electromagnetism.

Textbook: Whitmer, *Electromagnetics.*

Reference Books: Slater and Frank, *Electromagnetism;* Peck, *Electricity and Magnetism.*

Prerequisites: Physics 46 or 43 or 340 or 380.

Prerequisite or corequisite: Mathematics 57 or 420.

Honor and Graduate Courses—

510. (101) Thermodynamics and Kinetic Theory **(3-0; 3-0)**

A. B. Bhatia

Principles of thermodynamics with physical applications, kinetic theory, transport phenomena, Boltzman, Fermi-Dirac and Bose-Einstein statistics.

Textbooks: Sommerfeld, *Thermodynamics and Statistical Mechanics;* Zemansky, *Heat and Thermodynamics.*

Reference books: Jeans, *Kinetic Theory of Gases;* Kennard, *Kinetic Theory of Gases;* Loeb, *Kinetic Theory of Gases;* Ewing, *Thermodynamics for Engineers;* Burton, Smith and Wilhelm, *Phenomena at the Temperature of Liquid Helium;* Epstein, *Thermodynamics;* Bergmann, *Basic Theories of Physics.*

Prerequisites: Physics 43 or 46 or 340 or 380, Mathematics 40 or 304, 52 or 57 or 420.

516. (105) Solid State Physics **(2-0; 2-0)**

S. B. Woods

An introduction to the theory of solids, including a study of the properties of metals, semiconductors and dielectrics.

Textbook: Dekker, *Solid State Physics.*

Reference Books: Kittel, *Introduction to Solid State Physics;* Wannier, *Solid State Theory.*

Corequisite: Physics 570 (104).

520. (60) Geophysics **(3-3; 3-3)**

G. D. Garland and K. Vozoff

Physical structure of the earth and physical properties of the earth's crust, gravity, seismology, terrestrial magnetism, introduction to methods of geophysical exploration.

Prerequisites: Physics 46 or 380, Mathematics 40 or 304.

Corequisite: Mathematics 420.

Reference Books: Jeffreys, *The Earth;* Bullen, *Theory of Seismology;*

Nettleton, *Geophysical Prospecting for Oil;* Eve and Keys, *Applied Geophysics* (4th ed.); Stratton, *Electromagnetic Theory.*

540. (99) Advanced Electronics (2-1s; 2-1s)

Application of complex variable, Fourier series and Laplace transform to the analysis of electronic circuits with linear and non-linear elements. One hour per week will be spent in class discussion of problems.

Reference Books: Ryder, *Networks, Lines and Fields* (2nd ed.); Skilling, *Electrical Engineering Circuits;* Skilling, *Transient Electric Currents* (2nd ed.); Thomason, *Linear Feedback Analysis.*

Prerequisites: Mathematics 57 or 420 and Physics 56 or 440.

550. (102) Mathematical Physics (2-1s; 2-1s)

D. D. Betts

This course is intended as an introduction to the principal mathematical methods of dealing with the scalar and vector fields of Physics. Topics include the Sturm-Liouville theory of eigenvalue problems, matrices, partial differential equations, operational methods and Laplace transforms, Fourier transforms, Green's functions, integral equations and the non-linear equations and hydrodynamics.

One hour per week will be spent on class discussion of problems.

Reference books: Margenau and Murphy, *Mathematics of Physics and Chemistry;* Page, *Physical Mathematics;* Webster, *Partial Differential Equations of Mathematical Physics;* Morse and Feshbach, *Methods of Theoretical Physics;* Morse, *Vibration and Sound;* Band, *Introduction to Mathematical Physics.*

Prerequisite: Mathematics 57 or 420.

560. (100) Physical Optics (3-0; 3-0)

K. B. Newbound

The wave theory of the propagation of light in free space and in transparent media; classical electromagnetic theory of absorption, dispersion and scattering; introduction to spectroscopy.

Textbook: Ditchburn, *Light.*

Reference books: Sawyer, *Experimental Spectroscopy;* Harrison et al., *Practical Spectroscopy;* White, *Atomic Spectra.*

Prerequisites: Physics 42 and 53 or 360 or 480, Mathematics 57 or 420.

570. (104) Quantum Mechanics (2-0; 2-0)

L. E. H. Trainor

Introduction to the basic principles of quantum mechanics with application to problems in modern physics.

Reference books: Sherwin, *Introduction to Quantum Mechanics;* Landau and Lifschitz, *Quantum Mechanics;* Leighton, *Principles of Modern Physics.*

Prerequisites: Physics 470 (54), Mathematics 420 (57) and 430 (56).

Prerequisite or corequisite: Physics 480 (53).

571. (55b) Advanced Laboratory (0-4; 0-4)

Methods in experimental atomic physics, spectroscopy and nuclear physics, introduction to modern laboratory techniques. The number of hours required depends upon the student's complete program in third or fourth yaar.

(Restricted to honors students in Arts, and Engineering Physics.)
Prerequisite or corequisite: Physics 54 or 470.

572. Nuclear Physics (2-0; 2-0)

W. K. Dawson

Introductory survey of modern experimental theoretical nuclear physics.
Reference books: Green, *Nuclear Physics;* Evans, *The Atomic Nucleus;* Leighton, *Principles of Modern Physics.*
Corequisite: Physics 570 (104).

610. (106) Advanced Course in Theories of the Solid State (2-0; 2-0)

A. B. Bhatia

614. (107) Advanced Thermodynamics and Statistical Mechanics (2-0; 2-0)

H. Grayson-Smith and L. E. H. Trainor

620. Advanced Problems in Geophysical Exploration (2-0; 2-0)

G. D. Garland and K. Vozoff

622. (108) Advanced Earth Physics (2-0; 2-0)

G. D. Garland and K. Vozoff

640. Advanced Electromagnetic Theory (2-0; 2-0)

H. Schiff

650. (110) Special Topics in Theoretical Physics (2-0; 2-0)

654. Applications of Group Theory to Quantum Mechanics (2-0; 2-0)

L. E. H. Trainor

660. (103) Atomic Theory and Spectroscopy (2-0; 2-0)

K. B. Newbound and J. H. Harrold

664. (113) The Production and Optics of Free Elementary Particles and Ions (2-0; 2-0)

C. E. Challice

(Given in Calgary only.)

670. (109) Quantum Mechanics (3-0; 3-0)

H. Schiff

672. (111) Theoretical Nuclear Physics (2-0; 2-0)

J. T. Sample

674. (112) Radiation Physics (2-0; 2-0)

D. B. Scott

678. (113) Cosmic Radiation (2-0; 2-0)

B. G. Wilson

(Given in Calgary only.)

PHYSIOLOGY

Instruction offered by members of the Department of Physiology, Faculty of Medicine.

360. (60) General Elementary Human Physiology (3-0; 3-0)

E. O. Hohn, W. H. Cottle and Staff

This course comprises the essentials of human physiology.

For students of Household Economics.

Prerequisites: Zoology 1 or 220, Chemistry 42 or 350.

Textbook: Guyton, *Function of the Human Body.*

361. (61) General Elementary Human Physiology (3-3; 3-0)

E. O. Hohn, W. H. Cottle and Staff

For students of the senior years in Arts and Science.

Prerequisites: Zoology 1 or 220, Chemistry 42 or 350.

Lecture course is the same as 360 above.

Laboratory course in fall term only, provides experience in handling living tissues, and in certain basic physiological techniques. Credit must be obtained for laboratory work to allow credit for the course.

Textbooks: Guyton, *Function of the Human Body;* Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed. The latter textbook is recommended for those students proceeding to advanced courses in Physiology and to students registered in Honors programs.

462. (62) Neurophysiology (0-0; 3-5)

J. W. Pearce

For students taking honors Psychology or Physiology and other special students having the necessary prerequisites. The course comprises a study of the physiology of nerves and synapses, muscle, spinal reflex systems, brain centres and tracts, the special senses, the autonomic nervous system and certain aspects of behaviour.

The course content is offered in lectures, demonstrations, laboratory exercises and seminars.

Prerequisites: Physiology 61 or 361 and Neuroanatomy or Zoology 51 or 300.

Textbooks: Houssay, *Human Physiology;* Lovatt Evans, *Principles of Human Physiology,* 11th ed.; Fulton, *Textbook of Physiology,* 17th ed.; Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed.

Reference Texts: Fulton, *Physiology of the Nervous System;* Sherrington, *Integrative Action of the Nervous System;* Eccles, *The Neurophysiological Basis of Mind;* Eccles, *The Physiology of Nerve Cells;* Walsh, *Physiology of the Nervous System.*

463. Human Physiology (4-6; 4-5)

J. W. Pearce, C. Heath, E. O. Hohn, and Physiology Staff

A course designed for students in Honors programs in biological science, similar to Physiology 411, but less extensive in content. It includes a study of the circulatory, digestive and respiratory systems, and the phenomena of digestion, absorption, metabolism and excretion; a study of nerves and synapses, muscle, spinal reflex systems, brain centres and tracts, the special

senses, the autonomic nervous system and aspects of behaviour (corresponding to Physiology 462; and a presentation of the principles of action of endocrine glands and detailed treatment of several of these glands. The course content is offered in lectures, demonstrations, laboratory exercises and seminars. Clinical demonstrations are included.

Textbooks: Bell, Davidson and Scarborough, *Textbooks of Physiology and Biochemistry,* 4th ed.; Lovatt Evans, *Principles of Human Physiology,* 12th ed.; Houssay, *Human Physiology,* 2nd ed.; Fulton, *Textbook of Physiology,* 17th ed.; Bard, *Medical Physiology,* 10th ed.

Reference Texts: Davson, *Textbook of General Physiology;* Rushmer, *Cardiac Diagnosis;* Eccles, *The Neurophysiological Basis of Mind;* Eccles, *The Physiology of Nerve Cells;* Turner, *General Endocrinology,* 2nd ed.

Honor and Graduate Courses—

501. (101) Cardiovascular Reflex Activity (3-0; 0-0)

J. W. Pearce, C. Heath, C. W. Nash and K. M. Chapman

Principles of electrophysiological recording from sensory nerves; classical and modern manometry of cardiovascular pressure pulses; nerve receptors in heart and great vessels; cardiovascular effector mechanisms, biophysics of blood vessels; pharmacology of agents acting on the cardiovascular system; measurement and reflex regulation of the cardiac output; hormonal and central nervous integration of cardiovascular reflexes.

Prerequisites: Physiology 61 or 361 and preferably Physiology 463 or 411 (Medical).

502. (102) Methodology in Physiology (0-3; 0-3)

Staff

A theoretical and experimental problem in methodology related to a chosen physiological field will be arranged under staff supervision. The course will require library and laboratory investigation and a written report.

Prerequisites: Physiology 61 or 361 and preferably Physiology 463 or 411 (Medical).

503. (103) Nerve Impulse and Synaptic Transmission (3-0; 0-0)

J. W. Pearce, K. M. Chapman, C. W. Nash and M. K. Cottle

Histology of nerve cells and synapses; electrophysiological methods; nature of nerve impulse (ionic hypothesis); excitability of nerve; conduction in nerve; motor end plate and sympathetic ganglion activity; theories of synaptic transmission; facilitation and inhibition; spinal reflex characteristics; plasticity of the nervous system and memory.

Prerequisites: Physiology 61 or 361 and Physiology 62 or 462.

504. (104) Physiology of the Adrenal and Thyroid Glands (0-0; 0-3)

E. O. Hohn, W. H. and M .K. Cottle, C. W. Nash

Basic physiology of adrenal and thyroid glands; role of the adrenal in stress and certain diseases; pituitary-adrenal relationships; thyroid hormone and synthesis; triiodothyronine; thyroid response in cold and hibernation; thyroid disease; the adrenal medullary hormones; hormone estimation by physiochemical and bioassay procedures.

Prerequisites: Physiology 61 or 361 or Physiology 463 or 411 (Medical).
Corequisite: Biochemistry 300 or Biochemistry 11 or 411 (Medical).

505. (105) Advanced Physiological Technigues (1-6; 0-0)

C. Heath and Staff

A laboratory course designed to give experience in the use of more elaborate techniques in longer experiments. The student will assemble and test the apparatus for techniques described in the literature; classical as well as modern procedures will be represented.

Prerequisites: Physiology 61 or 361 or Physiology 463 or 411 (Medical).

506. (106) Tutorial and Reading Course Credit 4 hours

Staff

Comprises guided reading in selected topics followed by written and oral presentation of the material covered. Each student will be required to submit review type essays to be analyzed critically by a staff member and to be presented before the group. The course is designed to provide training in analysis, synthesis and communication of scientific material, as well as to allow accumulation of more advanced knowledge.

Prerequisites: Physiology 61 or 361 or Physiology 463 or 411 (Medical); at least one of Physiology 101 or 501, 103 or 503, 104 or 504 or an equivalent course in another department.

600. (200) Seminar (0-0; 1S-0)

Organized presentation and discussion of some aspect of human physiology, a different topic being chosen each year. A monograph will be prescribed and participants are expected to present some aspects of the subject.

Prerequisites: Physiology 61 or 361 or Physiology 463 or 411 (Medical).

POLITICAL ECONOMY

Professor—E. J. Hanson (Head)
Associate Professors—G. R. Davy, W. D. Gainer, G. K. Goundrey,* W. MacKenzie
Assistant Professors—F. R. Anton (Calgary), R. E. Baird, M. F. Bauer, B. R. Bociurkiw, M. J. Boote, W. F. Dawson, I. Moravchik, T. L. Powrie, D. M. Winch

Economics

Junior Courses—

200. (1) Principles of Economics (3-0; 3-0)

Members of the Department

A general introduction to the study of the tendencies underlying the wealth-getting and wealth-using activities of man.

Prerequisite for all senior Economics courses except 310, 311, and 330.

Senior Courses—

300. (60) Intermediate Economic Analysis (3-0; 3-0)

G. K. Goundrey

An intensive study of the theory of value and the theory of distribution, with applications to public policy.

Prerequisite: 1 or 200 or 51 or 302.

*On leave of absence.

310. (61) Canadian Economic Development (3-0; 3-0)

M. J. Boote

The development of the Canadian economy since the seventeenth century, with emphasis given to the period since Confederation.

311. Western European Development (3-0;3-0)

M. J. Boote

An interpretive study of the development of the economy of Western Europe. (Not offered in 1960-61).

320. (64) International Trade (3-0; 3-0)

T. L. Powrie

The basis of international trade, gains from trade, the balance of payments, foreign exchange rates, trade and national economic welfare, problems involved in trade, restrictive government policies, post World-War II attempts to broaden trade and investment.

Prerequisite: 1 or 200 or 51 or 302.

330. (65) Labor Problems (3-0; 3-0)

M. J. Boote

Theory of wages; methods of wage payment; hours of labor; real wages and standards of living; social security; unemployment; labor organization; collective bargaining; labor legislation.

340. (66) Money and Banking (3-0; 3-0)

M. Bauer

The principles of money, monetary systems, commercial banking, central banking, monetary theory and policy, foreign exchange.

Prerequisite: 1 or 200 or 51 or 302.

350. (67) Public Finance and Taxation (3-0; 3-0)

E. J. Hanson

Public expenditure, budgets, budgetary legislation, fiscal policies, taxation, public credit, intergovernmental relationships.

Prerequisite: 1 or 200 or 51 or 302.

360. (68) Economics of Agriculture (3-0; 3-0)

W. Mackenzie

Agricultural Production: The nature, composition and value of output, the factors of production in agriculture and the position of agriculture in the general economy.

Agriculture and the Consumer: Size of agriculture and the relation to economic progress, agriculture and the price level, the marketing and consumption of agricultural products, price stability and planning.

Prerequisite: 1 or 200 or 51 or 302.

370. (69) Business Finance and Financial Institutions (3-0; 3-0)

The promotion and financing of various forms of business enterprises; financial markets; the instruments of finance; investment media and corporate securities analysis; the changing structure of the business sector and its relationship to the rest of the economy.

Prerequisite: 1 or 200 or 51 or 302.

380. (62) National Income Analysis (3-0; 3-0)

W. D. Gainer

National income concepts and accounting; stability characteristics of the national income and related concepts over time; business cycle theories and investigations.

Prerequisite: 1 or 200 or 51 or 302.

390. (63) Comparative Economic Systems (3-0; 3-0)

An analysis of the ways in which societies organize their economic life with special emphasis on capitalism, socialism, and communism.

Prerequisite: 1 or 200 or 51 or 302.

391. The Soviet Economy (3-0; 3-0)

A study of the economic administration of the Soviet Union, including the planning of production, distribution, capital formation, taxation, and the allocation of labour.

Prerequisite: Economics 1 or 200 or 51 or 302.

(Not offered in 1960-61).

471. Business and Government (3-0; 3-0)

An analysis of the changing structure of the business sector and its relationship to the state and the rest of the economy. Open to graduate and honors students and to pattern students with satisfactory standing in Economics 60 or 300 and 66 or 340.

(Not offered in 1960-61).

Honor and Graduate Courses—

500. (102) Modern Economic Theories (3-0; 3-0)

G. K. Goundrey

A critical examination of modern economic thought.

501. (101) History of Economic Theory (3-0; 3-0)

From the Mercantilists to the end of the nineteenth century.

(Not offered in 1960-61).

502. (105) A General Reading and Seminar Course (3-0; 3-0)

Members of the Department

Required of all Honors and graduate students. A seminar in which theoretical and applied problems in economics will be discussed.

593. Seminar in Slavonic and Soviet Studies (3-0; 3-0)

An interdepartmental seminar.

601. (120) Advanced Economic Theory (3-0; 3-0)

611. (121) Economic Development (3-0; 3-0)

M. Boote

613. (131) Economic Geography (3-0; 3-0)

621. (124) International Economics (3-0; 3-0)

T. L. Powrie

631. (125) Labour Problems **(3-0; 3-0)**
M. Boote

641. (126) Monetary Theory and Policy **(3-0; 3-0)**
M. Bauer

651. (127) Public Finance and Fiscal Policy **(3-0; 3-0)**
E. J. Hanson

653. (130) Transportation and Public Utilities **(3-0; 3-0)**
E. J. Hanson

661. (128) Agricultural Economics **(3-0; 3-0)**
W. MacKenzie

663. (132) Agricultural Marketing **(3-0; 3-0)**
W. MacKenzie

671. (129) Business and Government **(3-0; 3-0)**
W. D. Gainer

681. (122) Business Cycle Analysis **(3-0; 3-0)**
W. D. Gainer

691. (123) Comparative Economic Systems **(3-0; 3-0)**

Political Science

Junior Course—

200. (3) Elements of Political Science **(3-0; 3-0)**
G. R. Davy

A study of the principles and practices of modern government, with emphasis on the democratic constitutional state. Among the topics studied are the nature and theory of the state; types of constitutions; the functions and composition of the legislature, executive and judiciary; representation; political parties and pressure groups.

Senior Courses—

310. (63) History of Political Thought **(3-0; 3-0)**
B. Bociurkiw

A historical survey of political philosophy, especially in the modern period. A discussion of some of the main problems in the theory of the state, with selected readings from the outstanding thinkers, especially since Hobbes.

320. (54) Government of Canada **(3-0; 3-0)**
W. Dawson

A study of the structure and functioning of the government of Canada, especially of the Commons, the Senate, the Cabinet System, the Civil Service; and the role of political parties.

330. (58) Comparative Government **(3-0; 3-0)**
W. Dawson and B. Bociurkiw

A comparative study of the political institutions, particularly of Britain, the United States, France and the Soviet Union.
Prerequisite: Political Science 3 or 200.

340. (60) Soviet Government: Theory and Practice (3-0; 3-0)

B. Bociurkiw

A study of Soviet political and social theory, and an analysis of the Soviet political system, with special reference to: The Communist party, political institutions, federalism, foreign policy.

Prerequisite: Political Science 3 or 200 or the consent of the insrtuctor.

350. (59) Public Administration (3-0; 3-0)

W. Dawson

A comparative study, with special reference to Canada, the United States, and Great Britain, of the following:

the growth of the administration;
the civil service and its problems;
the theory of administration;
the organization and control of the government bureaucracy.

360. (55) International Politics (3-0; 3-0)

G. R. Davy

A study from the viewpoint of political science of the elements and general nature of the relations between modern states. The framework and functioning of international institutions—law, diplomacy and organizations—is studied and attention is paid to the political and other forces at work, including the role of power and the efforts to achieve international peace.

362. International Affairs in the 20th Century (3-0; 3-0)

G. R. Davy

A study of international affairs since 1900 with special emphasis on the growth and decline of the League System and the creation of the United Nations. (Not offered in 1960-61).

Honor and Graduate Courses—

500. (101) Reading and Seminar Course

Members of the Department

Required of all honor students. Topics for reading will be arranged with the department and discussed at class seminars.

510. (100) Advanced Political Thought (3-0; 3-0)

B. Bociurkiw

A detailed analysis of certain major political theories.

Prerequisite: Political Science 63 or 310 or the consent of the instructor.

531. Federal and Local Government (3-0; 3-0)

A reading and seminar course in the operation and problems of federalism and in the organization, functions and problems of local government.

Prerequisite: Political Science 54 or 320 or the consent of the instructor.

541. Seminar in Soviet Politics (3-0; 3-0)

B. Bociurkiw

An advanced study of several areas of Soviet domestic politics.

Prerequisite: Political Science 60 or 340 or the consent of the instructor.

543. Seminar in Slavonic and Soviet Studies (3-0; 3-0)
An interdepartmental seminar.

561. (102) International Institutions (3-0; 3-0)
G. R. Davy
An advanced course in international relations, with special emphasis on the role of public international law, international organizations and diplomacy.
Prerequisite: Political Science 55 or 360 or the consent of the instructor.

600. (120) Political Institutions (3-0; 3-0)
G. R. Davy

610. (121) Political Theory (3-0; 3-0)
B. Bociurkiw

621. Government of Canada (3-0; 3-0)
W. Dawson

651. (123) Public Administration (3-0; 3-0)
W. Dawson

661. (122) International Politics (3-0; 3-0)
G. R. Davy

PSYCHOLOGY

Professors—..... (Head), D. E. Smith
Associate Professors—A. J. B. Hough, R. C. Miles, P. O. Rempel, A. E. D. Schonfield (Calgary), D. Spearman, Lolita Wilson
Assistant Professor—C. N. Uhl

Junior Courses—

202. (40) An introduction to General Psychology (3-0; 3-0)
A survey of problems, methods and principles in various fields of psychology.

212. (42) General and Developmental Psychology (3-0; 3-0)
A. J. B. Hough and P. Rempel
A survey of problems, methods and principles in several fields of psychology, with particular emphasis on child, adolescent and adult development and behaviour.
(This course is designed primarily for students in professional schools, such as Nursing and Physical Education, and is not open to students with credit in another introductory course in Psychology.)

Senior Courses—

320. (57) Psychology Applied to Business and Industry (3-0; 3-0)
L. Wilson
Methods and results of psychological studies in such fields as:
(a) selection, placement, training and supervision of personnel;
(b) promotion of efficiency and safety in production;
(c) advertising, selling and consumer research.

336. Individual Differences (3-0; 3-0)
A survey of the biological and social conditions contributing to variations among individuals; methods for describing individuality.

Prerequisite: Psychology 202 (40); or, with the consent of instructor, Psychology 212 (42) or 220 (47).

340. (52) Social Psychology (3-0; 3-0)

A study of the emergence of personality in various social interaction situations; analysis of the relationship of individual and social group. Consideration of the forces underlying development of the social order, with special attention given to crowds, mobs, panics, manias, cults, fashions, fads, social ideologies, social movements, and other forms of mass behavior.

Prerequisite: Psychology 40 or 202 or Sociology 40 or 202 or equivalent.

342. (58) Psychology in Relation to Human Welfare (3-0; 3-0)

The applications of psychology in fields of common interest to the humanities and social sciences, with special reference to: education; child training; vocational selection; training and guidance; mental hygiene; social and industrial relations; and political-social values.

(Not offered in 1960-61).

352. Developmental Psycholigy (3-0; 3-0)

A study of behavior as it is related to normal development and aging.

Prerequisite: Psychology 202 (40); or, with the consent of instructor, Psychology 212 (42) or 220 (47).

364. Learning (3-0; 3-0)

A study of acquisition, retention and utilization of learned behavior.

Prerequisite: Psychology 202 (40); or, with the consent of instructor, Psychology 212 (42) or 220 (47).

382. (62) Personality (3-0; 3-0)

Theoretical approaches to personality; behaviour dynamics; determinants of personality—biological, organic, experimental, sociological; the mature personality.

Prerequisite: Psychology 40 or 202.

430. (63) Theory and Practice of Psychometrics (3-3; 3-3)

L. Wilson

The nature of psychological tests, with practical work in administration, scoring and interpretation of tests.

Prerequisite: Any two University courses in psychology.

432. (64) Theory of Psychometrics (3-0; 3-0)

L. Wilson

The nature of psychological tests with emphasis on the underlying concepts of intelligence, aptitude, interest and personality, and of measurement in these fields.

Prerequisite: Any two University courses in psychology.

Note: Psychology 430 (old 63) and 432 (old 64) may not both be offered for credit.

460. (59) Experimental Psychology (3-3; 3-3)

C. N. Uhl

An introduction to the methods and principles of experimental investigation

in psychology with laboratory participation in demonstrations and exercises. Prerequisite: Psychology 40 or 202.

488. (61) Abnormal Psychology (3-0; 3-0)

D. SPEARMAN

A general introduction to abnormal Psychology.
Prerequisite: Psychology 62 or 382 and consent of the department.

Honor and Graduate Courses—

Candidates for honors will arrange their courses in consultation with the head of the department.

502. (105) History of Psychology (3-0; 3-0)

D. E. SMITH

An historical survey of problems and theories in psychology, including modern systems of psychology.
Prerequisite: Psychology 40 or 202 or Philosophy 40 or 240.

504. (106) Conference Course in Psychology for Honors and Graduate Students (3-3; 3-3)

520. (113) Seminar in Industrial Psychology (3-0; 3-0)

Prequisite: Psychology 57 or 320.

530. (109) Research in Psychometrics (3-3; 3-3)

Principles and methods of constructing and standardizing psychological tests, including a directed research project in this field.
Prerequisites: Psychology 59 or 460 and Psychology 63 or 430.

534. Experimental Design (3-3; 3-3)

Methodological techniques and conceptual analysis in the planning, execution, and evaluation of psychological research.
Prerequisite: Mathematics 305, Psychology 334, and Psychology 460 (59), or consent of instructor.

536. (107) Clinical Psychometrics (3-3; 3-3)

D. SPEARMAN

Diagnostic clinical tests: Wechsler-Bellevue, Binet, Minnesota Multiphasic, Rorschach, Thematic Apperception Test, Szondi, etc., with practical work in administration, scoring and interpretation.
Prerequisites: Psychology 61 or 488 and Psychology 63 or 430.

538. (116) Advanced Clinical Psychometrics (3-3; 3-3)

Prerequisite: Psychology 107 or 536.

540. (115) Seminar in Social Psychology (3-0; 3-0)

542. (117) Research in Personality and Social Psychology (3-3; 3-3)

546. (103) Psychology of Religion (3-0; 3-0)

560. (104) Advanced Experimental Psychology (3-3; 3-3)

The methods and principles of experimental investigations in psychology in relation to fundamental theoretical problems. The laboratory work will

familiarize the student with basic research design and procedure, and will afford an opportunity for independent investigation.
Prerequisite: Psychology 59 or 460.

562. (110) Research in Learning and Memory (3-3; 3-3)
Prerequisite: Psychology 59 or 460.

566. (111) Research in Sensory Processes (3-3; 3-3)
Prerequisite: Psychology 59 or 460.

568. (112) Research in Emotions and Motivation (3-3; 3-3)
Prerequisite: Psychology 59 or 460.

572. (101) Physiological and Comparative Psychology (3-3; 3-3)
Prerequisite: Psychology 59 or 460.

580. The Study of the Individual (3-0; 3-0)
A methodological course involving the application of a wide variety of psychological techniques to the intensive study of the individual.
Prerequisite or corequisites: Psychology 382 (62), Psychology 430 (63), Psychology 536 (107).

584. (114) Seminar in Personality Theory (3-0; 3-0)

588. (102) Abnormal Psychology (3-0; 3-0)
D. Spearman
The psychodynamics of abnormal behaviour as a basis for understanding mental development and adjustment, the psychoneuroses, the functional psychoses, and treatment.
Prerequisite: Psychology 61 or 488.

590. (108) Clinical Psychology and Therapy (3-3; 3-3)
D. Spearman
The theoretical aspects of therapeutic methods in relation to the psychologist's role in diagnosis and therapy, with practical instruction in interviewing, counselling and other techniques.
Prerequisites: Psychology 61 or 488 and Psychology 107 or 536.

RUSSIAN

See under Modern Languages.

SOCIOLOGY

See under Philosophy and Sociology.

SPANISH

See under Modern Languages

STATISTICS*

Instruction offered by members of the Departments of Mathematics and Psychology.

210. Introduction to Biometrics (3-1; 3-1)
(a) The number system. Functions and coordinates. Linear and quadratic equations in one and two unknowns. Second degree curves. Ex-

ponential and logarithmic curves. Use of logarithmic curves. Use of logarithms. The binomial theorem. Progressions. Permutations and combinations. Elementary probability. Notions of derivative and integral.

(b) Computational methods. Frequency tables. Histograms and frequency polygons. Averages (mean and media). Dispersion (range and standard deviation). Relation of sample to population. The normal distribution. Binomial and Poisson distributions. Chi-square criterion for goodness of fit. Contingency tables.

Estimation of sample mean and variance. Confidence limits. The t-test and F-test. Linear regression and correlation.

Textbooks: Smith, Selby and Kleiman, *Understanding College Algebra* (Holt); Kenney and Keeping, *Mathematics of Statistics Part One* (Van Nostrand). Selected portions of both texts will be studied.

Prerequisite: Mathematics 30 of high school.

This course is intended for students in Agriculture, but will be open to students in such fields as Psychology and Biology, with the consent of the Department of Mathematics.

255. Elementary Statistics (3-3; 3-3)

E. S. KEEPING

Graphs, tables, diagrams. Frequency distributions, averages, dispersion, moments. Elementary probability. Binomial, normal and Poisson distributions. Sampling. Regression and correlation. Significance tests. Applications to data in various fields.

Textbook: Kenney and Keeping, *Mathematics of Statistics,* Part I (Van Nostrand).

Prerequisite: Mathematics 30 of high school.

305. Behavioural Statistics (3-3; 3-3)

J. R. MCGREGOR AND C. N. UHL

Tabulation, graphical representation and reduction of data. Measures of location and dispersion. Probability and relative frequency. The binomial and normal distributions. Curve fitting and the chi-square test of goodness-of-fit. Relation between sample and population. Confidence intervals and confidence interval charts. The t and F distributions. Testing of statistical hypotheses. Linear regression and prediction. Simple correlation. Test of independence in contingency tables. Non-parametric tests.

Applications of the above statistical concepts to the evaluation and interpretation of empirical data in psychology and sociology.

Textbook: McNemar, *Psychological Statistics,* 2nd Ed. (Wiley).

Prerequisite or corequisite: Psychology 202 or Sociology 202.

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*With the exception of Statistics 305, the Statistics courses offered were formerly Mathematics courses and retain their old number (e.g. Statistics 210 was formerly Mathematics 210).

450. Probabiltiy and Statistics (3-0; 3-0)

E. S. KEEPING

Theory of probability. Distribution functions and characteristic functions.

Laws of large numbers. Sampling. Exact sampling distributions. Confidence intervals. Maximum likelihood. Methods of least squares. Analysis of variance. Statistical inference.

Textbook: Kenney and Keeping, *Mathematics of Statistics,* Part II (Van Nostrand).

Prerequisites: Mathematics 40 or 304 and preferably Mathematics 45 or 255.

560. Estimation and Statistical Hypotheses (3-0; 3-0)

Cramér - Rao inequality; Bhattacharya bounds; sufficiency and completeness; minimax and Bayes estimates based on order statistics.

Neyman - Pearson theory; similar regions; least-favorable distributions; principle of invariance; unbiased tests; non-parametric theory.

562. Theory of Games (2-0; 2-0)

E. S. KEEPING

Games in normal and extensive form. Methods of solution. Statistical games. Minimax strategies. Bayes procedures. Linear programming.

564. Analysis of Variance (3-0; 3-0)

Factorial designs; Latin squares; confounding; incomplete blocks. Regression theory. Missing value problems. Analysis of co-variance. Effects of non-normality. Split plots; Youden squares.

570. Probability Theory and Applications (2-0; 2-0)

T. V. NARAYANA

Limit theorems for random variables. Random walks and recurrent events. Applications to Markov chains and selected statistical problems.

660. Stochastic Processes (2-0; 2-0)

J. R. MCGREGOR

UKRAINIAN

See under Modern Languages.

ZOOLOGY

Professor—D. M. Ross

Associate Professors—R. C. B. Hartland-Rowe (Calgary), J. R. Nursall (Executive Officer)

Assistant Professors—S. A. Altmann, W. A. L. Fuller, C. P. Hickman, Jr., J. C. Holmes, V. Lewin, G. O. Mackie

220. (1) Elementary Zoology (3-3; 3-3)

STAFF

Animal organization; comparative morphology; essentials of histology; principal phenomena of distribution, behaviour, ecology, reproduction and development; evolution, variation and heredity.

Senior Courses—

300. (51) Comparative Anatomy of Chordates (3-3; 3-3)

J. R. Nursall

A comparative review of the chordates, with dissections of available types from all classes.

Prerequisite: Zoology 1 or 220.

350. (52) The Invertebrates (3-3; 3-3)

G. O. Mackie

A survey of the invertebrates with emphasis on functional anatomy and the evolution of organ systems.

Textbook: Borradaile et al., *Invertebrata,* 3rd edition.

Prerequisite: Zoology 1 or 220.

406. (55) Ornithology (0-0; 3-3)

V. Lewin

Origin, distribution, anatomy, taxonomy, behavior and ecology of the birds of the world, with emphasis on the birds of Alberta.

Prerequisite: Zoology 51 or 300.

(Not offered in 1960-61).

408. Mammalogy (3-3; 0-0)

W. A. Fuller

Origin, relationships and structure of mammals. A survey of the families of living mammals; past and present distribution of important groups; recognition and life histories of Alberta forms.

Prerequisite: Zoology 51 or 300.

(Not offered in 1960-61).

410. (53) Embryology (3-3; 3-3)

Development of selected types, chiefly vertebrate.

(Not offered in 1960-61).

440. Comparative Animal Physiology (3-3; 3-3)

C. P. Hickman

Organization and diversity of animal functions; nervous and endocrine integration; metabolism; reproduction, growth and metamorphosis.

Prerequisites: Zoology 51 or 300; 52 or 350. Zoology 350 may be taken as a corequisite with the instructor's permission.

452. Principles of Parasitism (3-3; 0-0)

J. C. Holmes

Host and parasite adaptations; relationships with other forms of symbiosis; effects of parasitism on the host and the parasite; parasitism and disease.

Prerequisite: Zoology 52 or 350. Zoology 350 may be taken as a corequisite with the instructor's permission.

462. Terrestrial Ecology (0-0; 3-3)

V. Lewin

The principles governing the relationships of terrestrial animals to their

environment and to one another; emphasis is placed on field work and research techniques.
Prerequisites: Two courses in Zoology.

464. Limnology (3-0; 0-0)
Physical and chemical characteristics of lakes; qualitative and quantitative techniques for determination of planktonic, benthic and fish production; principles of lake management.
Prerequisites: Zoology 51 or 300; 52 or 350.

Honor and Graduate Courses—

520. Seminar in Zoology (1-0; 1-0)
STAFF
Required of all fourth year Honors and Graduate Students.

521. (110) Mechanisms of Evolution (0-0; 3-0)
J. R. NURSALL
Selected topics dealing chiefly with current concepts of organic evolution.
Prerequisites: Zoology 51 or 300; 52 or 350; Genetics 51 or 451.
(Not offered in 1960-61).

525. Field Course in Zoology
STAFF
A survey of the terrestrial and freshwater fauna of Alberta alternates yearly with a survey of the marine and littoral fauna of part of the Pacific coast. The course lasts two weeks and follows the spring examination. Both parts are required for the Honors B.Sc. in Zoology and should be taken in the third and fourth years.
Prerequisites: Zoology 51 or 300; 52 or 350.

529. Special Problems in Zoology (3 hours either or both terms)
STAFF

540. Environmental Physiology (1-5; 1-5)
C. P. HICKMAN
A special topics course designed for the study of physiological adjustment of animals to the effect of environmental variables.
Prerequisites: Zoology 51 or 300; 52 or 350; Zoology 440 or Physiology 61 or 361; Biochemistry 50 or 300. Biochemistry 300 may be taken as a co-requisite with the instructor's permission.

555. Wildlife Parasitology (0-0; 3-3)
J. C. HOLMES
Morphology, life cycles, pathology and control of animal parasites of fish, birds and mammals, with special reference to forms found in Alberta game.
Prerequisites: Zoology 55 or 406, 408 and 452; or Zoology 55 or 406, 408, 52 or 350 and instructor's permission; or Zoology 51 or 300, 452 and instructor's permission.

562. (104) Conservation Topics (1-0; 1-0)
A reading and seminar course designed to cover biological conservation as practised in North America.

564. Limnology (6L; 6L)

A laboratory and seminar course in advanced fresh water biology.
(Not offered in 1960-61).

565. Principles of Conservation and Wildlife Management (3-3; 3-3)

W. A. Fuller and V. Lewin

Management of upland and migratory game birds, big game and fur-bearing mammals; discussion of legal aspects of conservation and the role of sanctuaries, National Parks and wilderness areas.
Prerequisites: Zoology 55 or 406, 408. These may be taken as corequisites with instructor's permission.

566. (101) Animal Behavior
(Not offered in 1960-61).

580. Histology and Microtechnique (3-3; 3-3)

G. O. Mackie

The essentials of histology are presented from a comparative standpoint, materials being drawn from all levels of the animal kingdom. Theoretical and practical instruction is given in fixation, staining, dissociation, microscopy, photomicrography and graphic reconstruction. Students make and study their own slides.
Prerequisites: Zoology 51 or 300; 52 or 350.
(Not offered in 1960-61).

AFFILIATED INSTITUTIONS

St. Stephen's College

St. Stephen's College is the divinity school of the United Church of Canada in the province of Alberta.

Courses of Study

Three Courses of Study are open to Candidates—

1. "The attainment of a B.A. degree, including Greek, to be followed by three years in the study of Theology, is strongly recommended by the Church. Before ordination every candidate shall spend 12 months in preaching and pastoral work."

or

2. "Three years, at least, in Arts, followed by three years in Theology. Before ordination every candidate shall spend 12 months in preaching and pastoral work."

or

3. "Two years' preaching under the supervision of a Presbytery, with appropriate studies, and four years of a mixed Arts and Theological course in College."

Note: All courses must start from University matriculation.

Suggested Classes in Arts for Students Selecting Course No. 2

(a) English Language and Literature (three years).
(b) Two languages, one of which must be Greek (two years in each).
(c) Philosophy, including psychology, logic and ethics (two years).
(d) Two other subjects from the Arts curriculum at the option of the student (one year in each).

The Arts Course

English Language and Literature; Philosophy, including psychology, logic and ethics; one language; and any one option from the Arts course.

Theological Course

Homiletics: Pastoral Theology; Systematic Theology; New Testament Language and Literature; Old Testament Literature; English Bible; Church History; Christian Ethics and Sociology.

By an arrangement with the University, a course in Biblical Literature is given which is open to students of the University and counts for credit on an Arts course.

Hebrew

GEORGE LINDSAY VOGAN, B.A., B.D. (Queen's), M.A. (Cantab.)

Hebrew offers four courses under the numbers 100, 300, 340 and 400 and is now, with the consent of the Dean of Arts and Science, open to others besides theological students.

Hebrew 100 is the beginners' course. Students who make really good progress may proceed in the second year to Hebrew 340. Those not doing so well will be promoted to Hebrew 300. Hebrew 400 will count as a senior course.

Hebrew 100 or Hebrew 300 or 340 may be offered as A options in the first two years, but no student will receive credit for Hebrew 100 until he has subsequently fulfilled the requirements in Hebrew 300 or 340.

Students who do well in the subject may progress through Hebrew 100 and 340 to 400. Weaker students will proceed to Hebrew 100, 300, 340. or 400.

100. (1) Elements of Hebrew **(3-0; 3-0)**

G. L. VOGAN

Basic grammar and selected readings from Ruth and Samuel.
Textbook: A. B. Davidson, *Introductory Hebrew Grammar.*
Text: Kittel's *Biblia Hebraica;* Bagster's *Lexicon.*
(Not offered in 1960-61).

300. (2) Elements of Hebrew Syntax **(3-0; 3-0)**

G. L. VOGAN

Studies in Hebrew grammar and syntax. Readings from the prophets and poets of the Old Testament.
Textbooks: Davidson's *Hebrew Grammar;* Weingreen's *Grammar for Classical Hebrew;* Gesenius' *Hebrew Grammar.*
Prerequisite: Hebrew 100.
(Offered in 1960-61).

340. (40) Hebrew Syntax **(3-0; 3-0)**

G. L. VOGAN

All of Hebrew 300, with more extensive reading and more advanced syntax.

400. (52) Advanced Hebrew

G. L. VOGAN

A seminar course to be arranged with the professor.
Prerequisite: Hebrew 300 or 340.

St. Joseph's College

This College, established under the authority of the Roman Catholic Church, is directed by the Brothers of the Christian Schools (Christian Brothers). It was affiliated with the University of Alberta by resolution of the Senate, May 13, 1926.

Cooperating with the University, the College offers instruction in the following courses:

History

200. (10) European History (3-1s; 3-1s)

Brother Bonaventure

The history of Europe from the decline of the Roman Empire in the West to the present.

(See page 116).

302. (74) Europe 1095-1305 (3-0; 3-0)

Brother Bonaventure

The history of Europe from the First Crusade to the residence of the Popes at Avignon.

(Not offered in 1960-61).

Philosophy

246. (44) The Philosophy of Aquinas (3-0; 3-0)

Brother Anselm

(See page 138).

356. (56) The Moral Philosophy of Aquinas (3-0; 3-0)

Brother Anselm

(See page 139).

366. Christian Apologetics (3-0; 3-0)

Brother Prudent

A doctrinal and apologetical treatment of the key teachings of Christianity; a survey of the new Testament, the History of the Church, and the Encyclicals. (This course is an option from Division B for Roman Catholic students.)

St. Aidan's House

St. Aidan's House, 11009 89th Avenue, is maintained under the auspices of the Anglican Church in Canada as a religious and recreational centre for all students. A limited number of male students can also be given residential accommodation. Enquiries may be addressed to the Faculty Adviser, St. Aidan's House, 11009 89th Avenue, Edmonton.

VIII

The Faculty of Agriculture

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

The Faculty of Agriculture was established at the University of Alberta in 1915 and the first students to receive the degree of Bachelor of Science in Agriculture (B.S.A.) graduated in 1918. The present B.Sc. degree was first given in 1924.

The four-year course in Agriculture provides education in the science of agriculture. The Faculty has under its direct administration the departments of Agricultural Engineering, Animal Science, Dairy Science, Entomology, Plant Science and Soil Science. Many of the courses which are fundamental to the science of agriculture are given in other departments of the University, since the underlying scientific principles are the same as in any other field. It is the function of the departments in this Faculty to apply these principles to the solution of agricultural problems and to seek, through research, new information.

Graduates of the Faculty are engaged in teaching, research, extension, and administrative work related to agricultural production, marketing, and processing; in the manufacture and distribution of such essentials as feeds, fertilizers, and machinery; in the handling of agricultural products; and in farming. During the past ten years an increasing number of agricultural industries have offered attractive opportunities for graduates of this Faculty.

The departments in the Faculty also offer advanced degrees, and carry on extensive programs of research. The departments of Animal Science, Plant Science, and Soil Science operate experimental farms used in the teaching and research programs of these departments. All departments have space and facilities for laboratory research.

A modified first year in Agriculture may be taken at the University of Alberta in Calgary by registering in the program listed on page 47 of this Calendar. The second, third, and fourth years in Agriculture are offered at the University of Alberta in Edmonton only. Since the program offered at Calgary is a modified one, students are advised to take the first year in Agriculture at Edmonton wherever convenient.

Student Guidance

The Dean of the Faculty of Agriculture will be pleased to confer with students at any time.

Students of the second, third and fourth years will be assisted and guided in connection with their registrations by members of the Agricultural Registration Committee.

(2) ADMISSION

Matriculation Requirements

Students from the high schools of Alberta seeking admission to the Faculty of Agriculture will be required to present either—

I.—The High School diploma with "B" or higher standing in the following courses and an average in them of at least 60%:

1. English 30.
2. Social Studies 30.
3. Mathematics 30.
4. Chemistry 30.
5. and 6. Two of Physics 30
   Biology 32
   French 30 or German 30 or Latin 30.

Students should have Physics 30 where possible.

or

II.—A diploma from a Provincial School of Agriculture, together with "B" or higher standing in Literature 20; Language 20; Social Studies 20; *one* of French 20, German 20, or Latin 20; Mathematics 30; Chemistry 30; Physics 30 or Biology 32; with an average in the three grade XII courses of at least 60%.

Students who completed Grade XII in 1954 or earlier will be given full consideration for admission. They are advised to write to or to see the Registrar of the University and to provide a complete transcript of their high school records.

Candidates from outside Alberta will be required to meet equivalent standards.

These general regulations notwithstanding, the University may in its discretion refuse admission to any applicant.

(3) PROMOTION

1. Inasmuch as a rigid year system is not followed in the Faculty of Agriculture, promotion from year to year is made by Faculty Council upon the recommendation of (a) the First-Year Committee in the case of first-year students, and (b) the Agricultural Revisions Committee in the case of students of the succeeding years.
2. In general, promotion to the third year in Agriculture will be granted only to students who have passed all first and second year subjects required; exception may be granted when a student has passed all first and second year subjects but one and has an average standing for the two years of at least 60%.
3. Students transferring from other universities normally will be required to take, as a minimum, the equivalent of a regular senior year in attendance at the University of Alberta before the degree of B.Sc. in Agriculture will be granted.

The attention of students in Agriculture is directed to the fact that admission to postgraduate studies leading to the M.Sc. degree is based primarily upon the quality of the undergraduate work.

(4) PROGRAMS OF STUDY

The Degree of B.Sc. In Agriculture

In the Faculty of Agriculture, courses are offered leading to the degree of B.Sc. in Agriculture.

FIRST YEAR

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Agriculture 100	1	...	1	3
Botany 202	2	4	...	...
Chemistry 230	4	3	4	3
Economics 200	3	...	3	...
English 220	3	...	3	...
Mathematics 210	3	1	3	3
Public Speaking 100	...	2	...	...
Zoology 225	...	...	3	3
Physical Education	...	2	...	2

SECOND YEAR

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Animal Science 240	3	3	3	3
Chemistry 350	3	3	3	3
Microbiology 360	3	3	3	3
Plant Science 240	3	3	3	3
Public Speaking 200	...	1	...	1
Soil Science 340	3	3	3	3

THIRD YEAR

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Agricultural Eng. 240	...	...	3	3
Dairy Science 240	3	...	3	...
Entomology 300	3	3	...	...
Genetics 452	3	...	3	...
Electives at least two full courses or equivalent	...	...	...	...

FOURTH YEAR

Agriculture 451 and four full senior courses or equivalent plus a project course, or five full senior courses or equivalent.

In the third year students may continue in a general program designed to provide a broad training in agriculture or they may begin specialization in one of several fields.

Students must register first for courses in which they are deficient, second for required courses, and third for elective courses to the extent of the required credit. Normally, a student having advance senior credits must, in fourth year,

register for a normal year's program including extras. Students may, under advice, register for additional courses up to a maximum of six full courses or equivalent in any one year. This total may not be exceeded except by special permission of the Dean of the Faculty.

In order to exclude from the contract for graduation courses in excess of the minimum requirement, the student must designate such courses as "extras" at the time of registration for the final year. Changes in registration can be made only by arrangement with the Registration Committee before November 1 in the case of full-year or first-term courses, or before February 1 in the case of second-term courses.

Attention is directed to the regulation that a student is responsible for the completeness and accuracy of his registration.

First Year at the University of Alberta In Calgary

This is a modified program and students are advised to take the first year in Agriculture at Edmonton wherever convenient.

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Botany 201	3	3	3	3
Chemistry 230	4	3	4	3
English 200 or 210	3	...	3	...
Mathematics 200 or 201 or 254	3	3?	3	3?
Zoology 220	3	3	3	3

Note: Students desirous of majoring in Agricultural Economics would be permitted to substitute Economics 200 for either Botany or Zoology in the foregoing program.

The second, third, and fourth years in Agriculture are offered at the University of Alberta in Edmonton only.

Second-Class Standing

At least second-class standing in a minimum of four full courses or the equivalent in third and fourth years will be required for graduation.

Any student who at the normal time of graduation lacks the required number of courses with second-class standing may apply for supplemental examinations for the purpose of raising marks in any subjects of senior grade previously passed.

Required Subjects, Third and Fourth Years

Agricultural Engineering 240; Dairy Science 240; Entomology 300; and Genetics 452 are required by all students in the third year.

Agriculture 451 is to be taken by all students in their graduating year.

Additional courses required in General and Special Programs are listed below.

General Program

Third Year: Horticulture 341 and Plant Pathology 480; Soil Science 420 and 430.

Fourth Year: Animal Husbandry 468 and 469, or another senior animal husbandry course; Farm Management 362 (or possible alternative course that may be developed); and *two* of Agricultural Engineering 301 and 302; Crop Ecology 353 and Field Crops 354; Dairy and Food Technology 351 (and a balancing second term course); Economics 360 or 361; *one* of Entomology 414, 422, 471, or 475; second course in farm management; Poultry Husbandry 452 (and a balancing second term course); alternative full course with approval.

Special Programs

Those registering in special programs must consult with the department chiefly concerned and obtain the department's approval for the courses to be taken. The program must be submitted to the Registration Committee for approval at the time of registration.

Agricultural Economics

(Under supervision of Department of Political Economy)

Third and Fourth Years: Economics 300, 360, 361, Farm Management 362; *three* of the following: Accounting 200; Mathematics 255; Animal Husbandry 468, 469; Soil Science 420, 430; Crop Ecology 353 and Field Crops 354; Psychology 320; a course in Business Administration.

Processing Agricultural Products

(Under supervision of an inter-departmental committee)

Third and Fourth Years: Biochemistry 300; Chemistry 370; Dairy and Food Bacteriology 465, 466; Soil Science 430. Electives.*

*As the electives depend on the type of processing desired, students should consult the chairman of the supervising committee.

Department of Agricultural Engineering

Industrial Agriculture

Third Year: Physics 200; Business Administration 300.

Fourth Year: Agricultural Engineering 301, 302, 303, 304, 305, 401, plus one course to be selected.

Department of Animal Science

Animal Husbandry

Third Year*: Animal Husbandry 471; Farm Management 362; Soil Science 420, 430; Veterinary Science 451. Genetics 453 is a required course for students who plan to major in Animal Breeding.

Fourth Year*: Agricultural Engineering 301, 302, or another course in Agricultural Engineering or a course in Business Administration or Economics 361; Animal Husbandry 465, 466, 468, 469; Crop Ecology 353, Field Crops 354; Poultry Husbandry 455 or, for Animal Breeding majors, Genetics 462.

Poultry Husbandry

Third Year*: Agricultural Engineering 301, 302 or Farm Management 362; Poultry Husbandry 452, 453.

Fourth Year*: Animal Husbandry 469; Poultry Husbandry 454, 455, 459, 460. Electives from Agricultural Engineering 301, 302, Animal Husbandry 465, 466, Economics 360, Horticulture 341.

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*These programs are designed primarily for students who do not plan to proceed beyond the B.Sc. level. Students who anticipate proceeding to graduate study are urged to consult the head of the department to design programs better adapted to their requirements.

Department of Dairy Science

The following course patterns may be modified in consultation with the head of the department:

Dairy and Food Technology; Dairy and Food Bacteriology; Dairy and Food Chemistry

Third Year: Biochemistry 300; Dairy and Food Technology 350.

Fourth Year: Dairy and Food Bacteriology 465, 466; Dairy and Food Chemistry 470 and 571; Dairy Science 490; Chemistry 370 or 372; Mathematics 200 or 201; Elective.

Agricultural and Food Bacteriology

Third Year: Biochemistry 300; Dairy and Food Bacteriology 465, 466.

Fourth Year: Dairy and Food Chemistry 470; Dairy Science 490; Mathematics 200 or 201; Soil Science 430; Dairy and Food Bacteriology 471; Bacteriology 361 or Dairy and Food Technology 350 or Physics 200 or Chemistry 312 or 370; Elective.

Department of Entomology

Third Year: Entomology 471; Genetics 453; Physics 200; German 110*.

Fourth Year: Entomology 422*; Entomology 414*; Zoology 350; *one* of Botany 300, 310; Genetics 612; Philosophy 360, Zoology 521 and *one* of Biochemistry 300; Biometrics 454; Chemistry 370; Chemistry 312; Crop Ecology 353; Geology 353; Plant Pathology 480; Zoology 300.

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*Students intending to take postgraduate work in Entomology are required to take German 210 or another approved language but may leave either Entomology 414 or 422 until first postgraduate year. Other students may substitute for German 210 another course approved by the Department but should take both Entomology 414 and 422 in their final year. Students with special interests may elect other courses in consultation with the head of the department.

Department of Plant Science

General Plant Science*

Third and Fourth Years: Animal Husbandry 468, 471; Crop Ecology 353; Farm Management 362; Field Crops 354; Horticulture 352; Plant Pathology 480; Soil Science 460.

Electives: Animal Husbandry 469; Biometrics 454; a course in Business Administration; Genetics 462; Horticulture 356, 357; Plant Pathology 482; Plant Physiology and Biochemistry 477.

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*Students with special interests and those intending to pursue graduate study may in consultation with the head of the department, or the division concerned, arrange to specialize in one of the following divisions:

Crop Ecology	Horticulture
Field Crops	Plant Pathology
Genetics	Plant Physiology and Biochemistry

Department of Soil Science

Soil Genesis and Classification; Soil Physics; Soil Chemistry; Soil Microbiology; Soil Fertility

Third and Fourth Years: Soil Science 420, 430, 460, 470, and *one* of the following: Biometrics 454 *or* Geology 201.

Electives: *Four* of the following to be taken: Animal Husbandry 468, 469, Biochemistry 300 or 350; Biometrics 454; Botany 320; Chemistry 370; Crop Ecology 353 and Field Crops 354; Dairy and Food Bacteriology 465 and a balancing elective; Farm Management 362; Geology 201, Mathematics 200 or 201; Physics 200 or 240; Soil Science 501; other approved elective.

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Accounting 200	3	2	3	2
Agricultural Engineering 301	3	3	...	...
Agricultural Engineering 302	...	...	3	3
Agricultural Engineering 303	3	3	...	...
Agricultural Engineering 304	...	...	3	3
Agricultural Engineering 305	3	3	3	3
Agricultural Engineering 401	...	3-5P	...	3-5P
Animal Husbandry 465	3	3	...	...
Animal Husbandry 466	...	...	3	3
Animal Husbandry 468	3	3	...	...
Animal Husbandry 469	...	...	3	3
Animal Husbandry 471	2	...	2	...
Animal Science 472	...	2-4P	...	2-4P
Biochemistry 300	3	3	3	3
Biochemistry 350	3	3	3	3
Biometrics 454	...	4	...	4
Botany 300	3	3	3	3
Botany 310	3	3	3	3
Botany 320	3	3	3	3
Botany 340 (as full-year or half-year course)	3	3	3	3
Business Administration 300	3	...	3	...
Chemistry 312	2	6	2	6
Chemistry 370	3	3	3	3
Crop Ecology 353	3	3	...	...
Dairy and Food Technology 350	3	3	3	3
Dairy and Food Technology 351	...	3	...	...
Dairy and Food Bacteriology 465	3	3	...	...

Subjects	First Term		Sec. Term	
	Lect.	Lab.	Lect.	Lab.
Dairy and Food Bacteriology 466	...	...	3	3
Dairy and Food Bacteriology 471	...	...	3	3
Dairy and Food Chemistry 470	3	3	3	3
Economics 360	3	...	3	...
Economics 361	3	...	3	...
Entomology 301	3	3	3	3
Entomology 414	1	5	1	5
Entomology 456	2	4	2	4
Entomology 471	...	3P	...	3P
Entomology 475	3L	...	3L	...
Farm Management 362	3	3	3	3
Field Crops 354	...	...	3	3
French 100	5	...	5	...
Genetics 451	3	4	3	...
Genetics 453	...	4	...	...
Genetics 462	3	...	3	...
Geology 201	3	3	3	3
German 210	3	...	3	...
Horticulture 341	3	3	...	...
Horticulture 352	...	...	3	3
Horticulture 356	3	3	...	...
Horticulture 357	...	...	3	3
Latin 100	5	...	5	...
Mathematics 201	3	2	3	2
Mathematics 304	3	2	3	2
Mathematics 450	3	...	3	...
Physics 200	3	2	3	2
Physiology 361	3	2	3	2
Plant Pathology 480	...	...	3	3
Plant Pathology 481	3	3	...	...
Plant Pathology 482	...	...	3	3
Plant Physiology and Biochemistry 477	...	...	...	3
Poultry 452	3	3	...	...
Poultry 453	...	...	3	3
Poultry 454	3	3	...	...
Poultry 455	...	...	3	3
Poultry 459	3	3	...	...
Poultry 460	...	...	3	3
Russian 210	5	...	5	...
Soil Science 420	3	3	...	...
Soil Science 430	...	...	3	3
Soil Science 460	3	3	...	...
Soil Science 470	...	...	3	3
Veterinary Science 451	1	...	1	...

In addition to the courses listed above, students may, with the consent of the Registration Committee and the Dean, elect certain other courses in the University. The calendars of other faculties may be consulted with reference to the nature of courses offered.

(5) GRADUATE STUDIES

Programs leading to advanced degrees (M.Sc. and Ph.D.) are offered by the Departments of Animal Science, Dairy Science, Entomology, Plant Science,

and Soil Science. Course programs and thesis projects are arranged in consultation with members of the departmental staffs.

General information concerning the Faculty of Graduate Studies and details concerning admission, fees, etc., are given in the special calendar for that Faculty. Information on requirements and opportunities in specific fields of work may be obtained from the appropriate department.

(6) DETAILS OF COURSES

NOTE: The hours of instruction per week for both terms are shown at the top of each course description. The letter "L" attached to a figure signifies lecture-laboratory-hours, the letter "P", project-hours, and the letter "S" seminar-hours. Unless otherwise specified, the first figure in each term indicates lecture-hours and the second laboratory-hours.

AGRICULTURE

Junior Course—

100. History of Agriculture (1-0; 1-3)

C. F. BENTLEY

Development of agriculture from time of earliest records to the present with emphasis on its relation to human welfare.

Senior Course

451. Practical and Professional Agriculture (1-0; 1-0)

C. F. BENTLEY

The present status of practical and professional agriculture. Agricultural organizations in the business and professional fields. Employment opportunities.

AGRICULTURAL ENGINEERING

STAFF:

Professor and Head—F. V. MacHardy
Associate Professor—B. T. Stephanson

Junior Course—

240. An Introduction to Agricultural Engineering (0-0; 3-3)

F. V. MACHARDY

A study of agricultural machines and structures in relation to agricultural production. Layout analysis. Application of motion and time studies to the operation of agricultural equipment.

Senior Courses—

301. Heating, Ventilating and Air Conditioning Agricultural Buildings (3-3; 0-0)

F. V. MACHARDY

Environmental requirements as determined by physiological principles. Environmental control.
Textzook: Barre and Sammett, *Farm Structures.*

302. Farm Structures (0-0; 3-3)

F.V. MACHARDY

Structural design of agricultural buildings.
Textzook: Barre and Sammett, *Farm Structures.*

303. Agricultural Power Units (3-3; 0-0)

B. T. STEPHANSON

Engineering principles as related to the selection of power units.
Textbook: Barger, Carleton, McKibben & Bainer, *Tractors and Their Power Units.*

304. Agricultural Machines (0-0); 3-3)

B. T. STEPHANSON

Characteristics of the functional elements of farm machines. Methods of evaluating machine performance.
Textbook: Bainer, Kepner and Barger, *Principles of Farm Machinery.*

305. Agricultural Materials Handling and Processing (3-3; 3-3)

F. V. MACHARDY

Characteristics of fluid, free-flow and non free-flow materials, as related to storage, flow, elevation and transport. Principles of drying and refrigeration.
Textbook: Henderson and Perry, *Agricultural Process Engineering.*

401. Project Course (3 to 5; 3 to 5)

STAFF

Application of business principles to the solution of actual problems involving materials handling, equipment selection and production layout.

ANIMAL SCIENCE

Courses in Animal Science subjects are listed under the designations: Animal Husbandry, Animal Science, Poultry Husbandry, and Veterinary Science.

STAFF

Professor and Head, Animal Science—L. W. McElroy
Professors, Poultry Husbandry—Dr. R. Clandinin, A. R. Robblee
Associate Professors, Animal Husbandry—R. T. Berg, J. P. Bowland
Assistant Professor, Animal Husbandry—J. M. Asplund
Lecturer, Veterinary Science—J. G. O'Donoghue

Animal Husbandry

Senior Courses—

465. Animal Breeding (3-3; 0-0)

R. T. BERG

Principles of genetics and physiology of reproduction as related to animal improvement. Study of qualitative and quantitative inheritance, heterosis, evolutionary forces, population genetics, systems of mating, testing and selection methods.
Laboratory in appraisal of performance and conformation of farm livestock.
Prerequisite: Genetics 452.
Textbook: Rice, *Breeding and Improvement of Farm Animals,* 5th edition.

466. Applied Animal Breeding (0-0; 3-3)

R. T. Berg

A review of early and present day methods used in the breeding of livestock. A critical appraisal of selection theory, heritability estimation, environmental effects and correlation of characters in livestock breeding. Review of recent experiments.

Laboratory in biometrical techniques used in breeding and selection studies.

Prerequisite: A. H. 465.

468. Nutrition (3-3; 0-0)

J. P. Bowland and A. R. Robblee

A study of the various nutrients, including their character, functions and sources. A consideration of the processes of digestion and metabolism. Laboratory analysis covering the chemical and physical composition of feeding stuffs.

Corresponds to P.H. 454.

Prerequisite: Chemistry 250 or 350.

469. Nutrition and Feeding (0-0; 3-3)

L. W. McElroy, J. P. Bowland and J. M. Asplund

The application of nutritional principles and practices to the feeding of different classes of farm animals. A discussion of the various feeding standards and the adaptability of feeds to meet these together with laboratory exercises in compounding rations. A review of current literature in the field of animal nutrition with class discussions, including some of the fundamental principles involvtd in planning and conducting livestock experimental work.

Prerequisite: A. H. 468 or P.H. 454.

Textbook: Morrison, *Feeds and Feeding,* 22nd Ed.

471. Economics of Livestock Production (2-0; 2-0)

L. W. McElroy and J. M. Asplund

A consideration of the major economic problems in the field of livestock production. This includes a study of factors influencing production costs. A survey of Canadian and world production and competitive markets for livestock and livestock products.

Prerequisite or corequisite: An. Sci. 240.

Animal Science

Junior Course—

240. Introduction to Animal Science (3-3; 3-3)

Staff

An introduction to breeding, feeding, management, physiology, and anatomy of farm animals and poultry.

Senior Course—

472. Animal Science (2 to 4 P; 2 to 4 P)

Staff

A course in which the individual student may select a problem in live-

stock or poultry production, nutrition or breeding for library and laboratory study. Open only to fourth-year students.

Graduate Courses—

501. Research Projects in Animal Science (2 to 6 P; 2 to 6 P)
A course in which individual students select one or more topics for intensive laboratory or library study or both. In addition to meetings for discussion, a comprehensive written report on the topic or topics selected will be required.

512. Advanced Nutrition (3-3; 3-0)
STAFF
A lecture and reading course designed to consider classical studies, experimental techniques and recent advances in nutrition including reference to application in rations for livestock and poultry.
Laboratory: Experience in nutritional experimentation.

600. Animal Science Seminar (1S-0; 1S-0)
Reports by students on studies of the literature on selected topics with group discussion. Required each year of all graduate students in Animal Science.

Poultry Husbandry

Senior Courses—

452. Culling and Selection (3-3; 0-0)
D. R. CLANDININ
Characteristics of popular breeds and varieties of poultry. Principles of culling and selection. Selection programs. Poultry improvement policies. Factors affecting percentage hatch.
Prerequisite or corequisite: Genetics 452.

453. Poultry Breeding (0-0; 3-3)
D. R. CLANDININ
Sex and reproduction. Gametogenesis. Inheritance of characteristics. Breeding methods. National and provincial poultry improvement policies. Record keeping. Analysis of records.
Prerequisite: P.H. 452.

454. Nutrition (3-3; 0-0)
J. P. BOWLAND AND A. R. ROBBLEE
A study of the various nutrients, including their character, functions and sources. A consideration of the processes of digestion and metabolism. Laboratory analysis covering the chemical and physical composition of feeding stuffs.
Corresponds to A.H. 468.
Prerequisite: Chemistry 250 or 350.

455. Nutrition and Feeding (0-0; 3-3)
A. R. ROBBLEE
Nutrition requirements. Effects of deficiencies. Application of nutritional principles to poultry feeding. Feeding practices. Study of literature. Compounding rations. Costs.
Prerequisite: P.H. 454 or A.H. 468.

459. Processing Poultry and Poultry Products (3-3; 0-0)

A. R. Robblee

A study of factors affecting the quality of poultry and poultry products. Processing, market grades, and market trends.

Prerequisite: An. Sci. 240.

460. Diseases and Hygiene (0-0; 3-3)

D. R. Clandinin

Anatomy of the fowl. Surgery. Virus, bacterial, protozoan and fungus diseases. Nutritional disorders. Miscellaneous conditions. External and internal parasites. The mortality problem. Autopsies. Study of literature. Inspection of plants.

Prerequisite: Microbiology 360.

Veterinary Science

Senior Course—

451. Veterinary Science (1-0; 1-0)

J. G. O'Donoghue

Sanitation in relation to control of animal diseases. Regulations of the Dominion Animal Contagious Diseases Act. Use of biologics in control of diseases. Abnormal conditions affecting reproduction.

Prerequisite: An. Sci. 240.

BACTERIOLOGY

360. Microbiology (3-3; 3-3)

G. E. Myers and J. W. Carmichael

A course in general microbiology including classification, physiology and metabolism, serving as an introduction to the practical application of this knowledge to industrial processes, specific fields of animal and plant biology and public health.

The laboratory course illustrates the basic methods of studying micro-organisms and their products and introduces the principles of the application of this knowledge.

Prerequisites: Chemistry 230 and Botany 202.

Textbook: Stanier, Doudoroff, Adelberg—*The Microbial World, or* Pelczar and Reid—*Microbiology.*

BIOCHEMISTRY

300. General Course (3-3; 3-3)

H. B. Collier, C. M. Kay and Mary S. Spencer

The topics dealt with include: physico-chemical properties of protoplasm; chemistry of carbohydrates, lipids, proteins; enzymes; the physiological chemistry of digestion, respiration, excretion; intermediary metabolism, hormones, and nutrition.

Text: Harrow and Mazur, *Textbook of Biochemistry.*

Prerequisites: Chemistry 230 and 250 or 350.

350. Plant Biochemistry (3-3; 3-3)

Mary S. Spencer

This course is designed as an introduction to Plant Biochemistry for students in Botany and Plant Science. Topics dealt with include the

physico-chemical properties of protoplasm; the chemistry and metabolism of carbohydrates, lipids, proteins, and related plant constituents; photosynthesis and plant growth.
Prerequisites: Chemistry 230 and 250 or 350.

Students proceeding to the degree of M.Sc. or Ph.D. in Biochemistry should consult the head of the department with regard to requirements and research facilities.

BOTANY

Junior Course—

202. General Elementary Botany (2-4; 0-0)

Staff of the Department of Botany

Basic features of plant growth, structure and reproduction. Special references to plants of economic importance. Relation of plant life to human welfare. Brief survey of plant kingdom.

Senior Courses—

300. Flowering Plants (3-3; 3-3)

J. G. Packer

The origin and evolution of flowering plants; their morphology and classification; species concepts; plants in relation to their environment; principles of nomenclature.
Prerequisite: Botany 202, consent of instructor.

310. Plant Anatomy and Histology (3-3; 3-3)

R. G. H. Cormack

A course in the structure and development of organs and tissues of the higher plants. Emphasis is placed on the experimental approach to anatomical studies and on development and morphology.
Prerequisite: Botany 202, consent of instructor.

320. Plant Physiology (3-3; 3-3)

J. H. Whyte and G. A. Maclachlan

Fundamental aspects of physiology, with particular reference to the higher plants. The physiology of the cell in terms of physical and colloid chemistry.
Prerequisites: Botany 202, Chemistry 230, or consent of instructor.

340. Mycology (3-3; 3-3)

H. J. Brodie and Lorene L. Kennedy

Introductory Survey of the Fungi.
First Term: Systematic survey of structures, life cycles and classification of representative types.
Second Term: Physiology, cytology, genetics of fungi with emphasis on types of economic importance and types currently being investigated.
Prerequisite: Botany 202, consent of instructors.
Note: Students in Agriculture may take the first term separately.

400. Special Problems (6L; 6L)

Assigned reading or laboratory projects.
Prerequisites: one elementary and one senior course in Botany.

CHEMISTRY

230. Inorganic Chemistry (3-1S-3) (3-1S-3)

S. G. Davis, G. R. Freeman, R. N. O'Brien and W. J. Wallace

Lectures: The fundamental concepts of chemistry as applied to the elements and their compounds.

Laboratory: The preparation of compounds, quantitative chemistry, and semi-micro qualitative analysis.

Textbook: Sisler, Vander Werf and Davidson, *General Chemistry.*

Prerequisite: Chemistry 130 or 30 of High School or equivalent.

350. Organic Chemistry (3-3; 3-3)

R. K. Brown and R. S. Crawford

Lectures: An introduction to a study of the compounds of carbon.

Laboratory: The preparation of some organic compounds.

Textbook: Boyd and Morrison, *Organic Chemistry.*

Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd edition.

Prerequisite: Chem. 230.

370. Elementary Physical Chemistry (3-3; 3-3)

S. G. Davis

Lectures: Fundamental concepts of matter in relation to energy; thermochemistry; properties of gases, liquids and solids; solutions, equilibrium; phase rule; electrochemistry, colloids, kinetics of reaction.

Laboratory: Physical chemical measurements.

Prerequisites: Chem. 230, Math. 200 or 201.

372. Elementary Physical Chemistry (3-1S-3) (3-1S-3)

H. B. Dunford

Lectures: Fundamental concepts of matter in relation to energy; thermochemistry, properties of gases, liquids and solids; molecular structure; solutions, equilibrium, phase rule, electrolytes, electromotive force, surface chemistry, kinetics of reaction.

Laboratory: Physico-chemical measurements.

Textbook: Millard, *Physical Chemistry for Colleges;* Daniels, Mathews, Williams, Bender and Alberty, *Experimental Physical Chemistry.*

Prerequisites: Chem. 230; Physics 200 or 240; Math. 200 or 201. Prerequisite or Corequisite: Math. 304. For honors students only, except by consent of instructor.

CIVIL ENGINEERING

Junior Course (offered only by arrangement with Civil Engineering Dept.)

152. Surveying Daily for two weeks at end of second term

Survey School Staff

A condensed course in the theory and practice of plane surveying as applied to irrigation works; including construction, use and care of instruments; simple computations. Field work, including chaining, rodding, levelling, transit work, note-keeping and the plotting of notes.

Available only to students from the Faculty of Agriculture who are registered for Irrigation Options.
Textbook: Davis and Foote, *Surveying*, (McGraw-Hill).

Senior Course (offered only by arrangement with the Civil Engineering Dept.)
A. PETERSON

338. Principles of Irrigation and Drainage (2-0; 2-0)
Elementary problems of hydraulics and drainage as applied to the lay-out of irrigation systems. Waterlogging and alkali formation.

DAIRY SCIENCE

Courses in Dairy Science are divided among the following sections: Dairy Science, Dairy and Food Technology, Dairy and Food Bacteriology, Dairy and Food Chemistry.

STAFF:
Professor and Head—L. F. L. Clegg.
Assistant Professors—J. M. de Man and F. W. Wood.

Dairy Science

Junior Course—

240. Introduction to Dairy Science (3-0; 3-0)
L. F. L. CLEGG, F. W. WOOD AND J. M. DE MAN
An introduction to the physiology of milk secretion, the economics, chemistry, physics and bacteriology of milk and milk products, the hygiene, economic and legal aspects of milk and milk production.

Senior and Graduate Courses—

490. Reading Project; Critcial Reviews of Selected Literature
L. F. L. CLEGG, F. W. WOOD AND J. M. DE MAN
Maximum yearly credit one full course.
(For fourth year students only.)

500. Seminar (1-0; 1-0)
L. F. L. CLEGG, F. W. WOOD, AND J. M. DE MAN
Reports and discussions of research problems. Required during each year of graduate studies of all graduate students in the department.

Dairy and Food Technology

350. Dairy and Food Technology (3-3; 3-3)
F. W. WOOD
The scientific and technical principles involved in unit operations and processes applied in the commercial manufacture of dairy and some other food products. To include heat exchanging, evaporating and condensing, emulsifying, storing and packaging.
Textbook: Parker, Harvey and Stettler, *Elements of Food Engineering*, Vols. 1, 2 and 3.

351. Principles of Hygienic Milk Production (0-3; 0-0)
F. W. WOOD AND L. F. L. CLEGG
Farm and local authority control of quality milk. Different systems of milk production and handling.

600. Advanced Dairy and Food Technology

F. W. Wood and L. F. L. Clegg

Specially selected problems intensively studied. May be required during each year of graduate study. Maximum yearly credit one full course.

Dairy and Food Bacteriology

465. Agricultural and Food Bacteriology (3-3; 0-0)

L. F. L. Clegg

The relationships, characteristics and metabolism of microorganisms concerned with agriculture and allied industries such as the fermentation industries, food processing (canning, freezing, radiation), food poisoning, industrial effluents, etc., and the scientific principles involved.
Prerequisite: Microbiology 360.

466. Dairy Bacteriology (0-0; 3-3)

L. F. L. Clegg

The bacteriology of the production and distribution of fluid milk and cream and consideration of some of the problems of the market milk industry. Milk supplies and public health. The bacteriological and biochemical aspects of pasteurization. The bacteriology of butter, cheese, ice cream, and other milk products.
Prerequisite: Dairy and Food Bacteriology 465.

471. Advanced Dairy and Food Hygiene (0-0; 3-3)

L. F. L. Clegg

The principles underlying the hygienic production of food and dairy products. The causes of spoilage and food poisoning. The detection of faults in dairy and food processing plants.
Prerequisites: Dairy and Food Bacteriology 465, 466.

601. Advanced Applied Bacteriology

L. F. L. Clegg

Specially selected problems intensively studied. May be required during each year of graduate study. Maximum yearly credit one full course.

Dairy and Food Chemistry

470. Dairy Chemistry (3-3; 3-3)

J. M. de Man

The chemistry of the major and minor constituents of milk and its products. The physiology and biochemistry of milk formation and secretion. Emulsions and foams. Enzymes and enzyme reactions in milk products.
Textbook: Jenners and Patton, *Principles of Dairy Chemistry.*
Corequisite: Biochemistry 300 or 350.

571. Advanced Food Chemistry (0-0; 3-3)

J. M. de Man

The relation of food consituents to industrial processes. Enzymic and non-enzymic deterioration reactions in foods. Surface chemistry. Flavor and sensory testing. Rheology of foodstuffs.
Prerequisite: Biochemistry 300 or 350.

602. Advanced Dairy and Food Chemistry

J. M. DE MAN AND L. F.L. CLEGG

Specially selected problems intensively studied. May be required during each year of graduate study. Maximum yearly credit one full course.

ECONOMICS

Junior Courses—

200. Principles of Economics (3-0; 3-0)

MEMBERS OF THE DEPARTMENT OF POLITICAL ECONOMY

A general introduction to the study of the tendencies underlying the wealth-getting and wealth-using activities of man.

(Prerequisite for all senior Economics courses except 310, 311, and 330.)

Senior Courses—

360. Economics of Agriculture (3-0; 3-0)

W. MACKENZIE

Agricultural Production.

The nature, composition and value of output, the factors of production in agriculture and the position of agriculture in the general economy.

Agriculture and the Consumer.

Size of agriculture and the relation to economic progress, agriculture and the price level, the marketing and consumption of agricultural products, price stability and planning.

Prerequisites: Economics 200 or 302.

361. Agricultural Marketing (3-0; 3-0)

W. MACKENZIE

The analysis of demand for and supply of major Canadian agricultural products; private, cooperative and governmental marketing agencies, their functions and coordination; appraisal of current marketing problems such as surplus price plans, cost of distribution, trade organizations and public regulation.

Prerequisite: Economics 200. Not open to second-year students.

ENGLISH

Junior Course—

220. English Language and Literature (3-0; 3-0)

F. M. SALTER

English 220 is designed to instruct students in the basic principles of English Composition and to increase their appreciation of good literature. English 220 is open to students in the Faculty of Agriculture only.

Textbooks: Eric Bentley, *The Play* (Prentice-Hall); Priestley, *The Good Companions* (Heinemann); S. V. Benét, *John Brown's Body* (Rhinehart); Blair and Chandler, *Approaches to Poetry* (2nd Edition); Rölvaag, *Giants in the Earth* (Harper's Modern Classics); *Harbrace College Handbook.*

ENTOMOLOGY

STAFF:

Professor and Head—Brian Hocking.
Associate Professor—G. E. Ball.
Assistant Professor—W. G. Evans.

300. A General Introduction to Entomology (3-3; 0-0)

B. HOCKING

The structure and life cycles of insects. An introduction to classification. The relationships of insects with their environment and with other forms of life as a basis to an appreciation of their significance in agriculture.

Textbook: Imms, *Outlines of Entomology.*

301. General Entomology (3-3; 3-3)

B. HOCKING AND G. E. BALL

Probable origin of insects, their structure and development. Introduction to classification. Their interrelationships with other forms of life as a basis to an appreciation of their significance in connection with agriculture and human health.

Textbook: Imms, *Outlines of Entomology.*

414. Morphology (1-5; 1-5)

G. E. BALL AND B. HOCKING

A detailed study of the structure of insects from the comparative and functional viewpoints.

Textbook: Snodgrass, *Principles of Insect Morphology.*

Prerequisite or corequisite: Entomology 300 or 301.

422. Taxonomy (3-3; 3-3)

G. E. BALL

Taxonomic principles and procedures. Classification of insects; habits of all important groups. Intending students are advised to make a general collection of at least 100 species of insects.

Textbook: Mayr, Linsley, and Usinger, *Methods and Principles of Systematic Zoology.*

Prerequisite or corequisite: Entomology 300 or 301, 414 desirable.

456. Insect Physiology (2-4; 2-4)

B. HOCKING

Life processes illustrated by insects with emphasis on those peculiar to them and their relatives.

Textbook: Wigglesworth, *The Principles of Insect Physiology.*

Prerequisite or corequisite: Entomology 300 or 301, 414 desirable. Permission of the instructor is required for registration.

471. A Project in Applied Entomology (0-3P; 0-3P)

STAFF

A survey of the literature on one or more topics in applied entomology with or without an experimental study of a related simple problem.

475. Insect Toxicology (3L; 3L)

W. G. Evans

The chemistry of insecticides and repellents and of accessory materials. Methods of insecticide evaluation. Theories of insecticidal activity.
Textbook: Shepard, *The Chemistry and Action of Insecticides.*
Prerequisite: Chemistry 250 or 350, Entomology 300 or 301 desirable.

512. Advanced Morphology, Physiology, and Histology (0-6; 0-6)

B. Hocking

A continuing course from Entomology 414 and 456, including detailed study of the morphology of an insect species, or of a particular structure in a number of insects, and more advanced practical work in physiology and histology.
Textbook: Wigglesworth, *The Principles of Insect Physiology.*

521. Taxonomy for Graduate Students (0-6; 0-6)

G. E. Ball

A continuation of studies begun in Entomology 523. Includes the preparation of synoptic tables, descriptions and illustrations of species, study of available literature upon the biology of all species in certain groups and the preparation of at least one systematic article for publication.

523. Advanced Taxonomy (0-6; 0-6)

G. E. Ball

Classification and biology of, and literature upon, one or more of the major orders. Intending students must have prepared a general collection, which shall include at least fifty species in any major order that they select for special study.
Prerequisite: Entomology 422.

FARM MANAGEMENT

Staff:

Professor—A. G. Ball.

362. An Introduction to Farm Management (3-3; 3-3)

A. G. Ball

The organization and management of farm business. Farm records, budgets, finance and credit, appraisal, job analysis and work simplification. Critical analysis of farm management research.
Prerequisite: Economics 200. Not open to second-year students.

GEOLOGY

Junior Course—

201. General Geology (3-3; 3-3)

R. E. Folinsbee

Processes of destruction and reconstruction; interpretation of physiographical features with map study; stratigraphic column with index fossils from each period; common minerals and rocks.
Textbook: Holmes, *Principles of Physical Geology* or Gilluly et al., *Principles of Geology.*

Senior Course—

459. Geomorphology and Glacial Geology (3-3; 3-3)

R. S. Taylor

A study of land forms and the processes which create and modify them; a study of glacial features and their relation to physiographic development; map reading; field trips.

Textbooks: Thornbury, *Principles of Geomorphology,* Flint, *Glacial and Pleistocene Geology.*

Geomorphology may be taken as Geology 465 (3-3; 0-0); Glacial Geology may be taken as Geology 466 (0-0; 3-3), with instructor's permission.

MATHEMATICS

Junior and Senior Courses—

200. Elementary Mathematics (6-0; 6-0)

Members of the Department

As Mathematics 201, with fuller treatment of Plane Trigonometry. This course is intended for students who wish to have a basic course in Mathematics acceptable as a prerequisite to Mathematics 304, but who do not have Mathematics 31 of high school.

Textbooks: as for 201, with Brixey and Andree, *Modern Trigonometry* (Holt).

201. Elementary Mathematics (3-2; 3-2)

Members of the Department

Rates of change. Differentiation and integration of simple functions. Applications. Analytic geometry of the conic sections. Exponential, logarithmic and trigonometric functions.

Textbook: Johnson and Kiokemeister, *Calculus with Analytic Geometry* (Allyn and Bacon), chapters 1-10.

Prerequisite: Mathematics 30 and 31 of high school.

210. Introduction to Biometrics (3-1; 3-3)

(a) The number system. Functions and coordinates. Linear and quadratic equations in one and two unknowns. Second degree curves. Exponential and logarithmic curves. Use of logarithms. The binomial theorem. Progressions. Permutations and Combinations. Elementary probability. Notions of derivative and integral.

(b) Computational methods. Frequency tables. Histograms and frequency polygons. Averages (mean and median). Dispersion (range and standard deviation). Relation of sample to population. The normal distribution. Binomial and Poisson distributions. Chi-square criterion for goodness of fit. Contingency tables.

Estimation of sample mean and variance. Confidence limits. The t-test and F-test. Linear regression and correlation.

Textbooks: Smith, Selby and Kleiman, *Understanding College Algebra* (Holt); Kenney and Keeping, *Mathematics of Statistics, Part One* (Van Nostrand). Selected portions of both texts will be studied.

Prerequisite: Math. 30 of high school.

304. Calculus and Analytical Geometry (3-2; 3-2)

MEMBERS OF THE DEPARTMENT

Polar and parametric coordinates. Methods and applications of integration. Series. Vectors and space geometry. Partial differentiation. Elements of differential equations. Multiple integration.

Textbook: Johnson and Kiokemeister, *Calculus with Analytic Geometry* (Allyn and Bacon).

Prerequisite: Mathematics 200 or 201.

450. Probability and Statistics (3-0; 3-0)

E. S. KEEPING

Theory of probability. Distribution functions and characteristic functions. Laws of large numbers. Sampling. Exact sampling distributions. Confidence intervals. Maximum likelihood. Method of least squares. Analysis of variance. Statistical inference.

Textbook: Kenney and Keeping, *Mathematics of Statistics,* Part II (Van Nostrand).

Prerequisite: Mathematics 304. (Previous completion of Mathematics 255, or Biometrics 454 or equivalent, is advisable).

MODERN LANGUAGES

Junior Courses—

French

100. or A Beginners' French (5-0; 5-0)

G. SAMUEL

This course is designed to enable students entering with complete matriculation but without French to begin their study of this language in the University. Normally, students will go from French 100 to French 200.

German

210. Scientific German (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

This course will cover the elements of German grammar. It aims to give students a reading knowledge of easy scientific German. It is designed to meet the needs of honors students from Science departments, students of the professional faculties and graduate students who require a knowledge of scientific German. Students will be given credit in this course but are strongly recommended to take the sequent course, German 310, in which advanced scientific texts are read.

Russian

210. Beginners' Russian (Science Section) (3-0; 3-0)

H. CHANAL

This course is designed to meet the needs of honors students in the science departments, students of the Faculties of Engineering, Agriculture, Dentistry, Medicine and Graduate Studies of any year who require a reading knowledge of Russian scientific literature. Students will be given credit in this course but are recommended to take the

sequent course, Russian 310, in which advanced scientific texts are read. Science students in the general course may also register in Russian 210 but will be required to complete Russian 310 before credit will be granted in Russian 210.

PHYSICAL EDUCATION

All first-year students are required to register in Phys. Ed. 218—Men or Phys. Ed. 228—Women.

Phys. Ed. 218. Recreational Activities (0-2; 0-2)

C. J. Drake and Staff

Emphasis on the fundamentals of the following recreational activities: touch football, Borden ball, volleyball, badminton, basketball, tumbling, aquatics, and golf.

Course required of all first-year men.

Phys. Ed. 228. Recreational Activities (0-2; 0-2)

R. Anderson and Staff

Emphasis on the fundamentals of the following recreational activities: tennis, aquatics, badminton, volleyball, basketball, social dancing and golf.

Course required of all first-year women.

PHYSICS

100. General Elementary Physics (3-2; 3-2)

K. Vozoff

An introductory course on the basic principles of Physics illustrated by experiments.

For students who have not completed Physics of Grade XII.

Textbook: Burton, Grayson-Smith and Quinlan, *College Physics*.

200. General Physics (3-2; 3-2)

J. H. Harrold and G. L. Cumming

A general course in the fundamentals of physics, including mechanics, properties of matter, heat, sound, electricity and light, illustrated by experiments. For students who have completed Physics of Grade XII.

Textbook: Kolin, *Physics*.

(Note: Students will not be able to take a further course in Physics without taking Mathematics 201. Physics 200 may not be taken as a second course following Physics 100.

PLANT SCIENCE

Courses in Plant Science subjects are arranged under the designations: Plant Science, Biometrics, Crop Ecology, Field Crops, Genetics, Horticulture, Plant Pathology, and Plant Physiology and Biochemistry.

Staff:

Professor and Head—John Unrau.

Professors—A. G. McCalla; A. W. Henry, Plant Pathology; L. P. V. Johnson, Genetics and Plant Breeding; Wm. G. Corns, Crop Ecology; Jan Weijer, Genetics and Plant Breeding.

Associate Professors—W. E. Smith, Field Crops; Saul Zalik, Plant Phys. and Biochem.; W. T. Andrew, Horticulture, R. H. Knowles, Horticulture
Associate Research Professors—G. W. R. Walker, Cytology; John Kuspira, Cytogenetics; K. A. Lesins, Forage Crops.
Assistant Professor—W. P. Skoropad, Plant Pathology.

Plant Science

Junior Course—

240. Principles and Practices of Crop Production (3-3; 3-3)

PLANT SCIENCE STAFF

The relationship of environment and plant adaptation as it affects distribution and production of crops; the history, adaptation, distribution, production and utilization of important crop plants; zonation and cultural practices in relation to permanent production and quality of our crops. The laboratory consists of a study of botanical structures and adaptive characteristics in relation to identification, classification and production of crop plants and control of weeds.

Advanced and Graduate Course—

500. Seminar in Plant Science (0-1S; 0-1S)

Oral reports by individual students covering the literature on selected topics. Required each year of all graduate students in Plant Science.

Biometrics

454. Biometrics (0-4; 0-4)

SAUL ZALIK

Principles and methods of statistical analyses applied to biological data; with emphasis on sampling, chi-square and t-tests, regression and correlation, analysis of variance (major emphasis), covariance, partial and multiple correlation and regression, individual degrees of freedom, transformation of data, simple experimental designs.
Textbook: Goulden, *Methods of Statistical Analysis,* 2nd edition.
Reference: Snedecor, *Statistical Methods,* 4th Edition.
Prerequisite: Mathematics 210.

Advanced and Graduate Course—

603. Experimental Design (2-2; 2-2)

L. P. V. JOHNSON AND W. E. SMITH

Principles of experimental design with analysis and critical interpretation of data; including consideration of randomized blocks, latin squares, factorial experiments, lattice designs, balanced incomplete-block designs, long-term experiments.
Textbook: Cochran and Cox, *Experimental Designs.*
Prerequisite: Biometrics 454.

Crop Ecology

Senior Course—

353. Range Management (3-3; 0-0)

WM. G. CORNS

Ecology, multiple use and management of rangeland. Characteristics

and habits of desirable and undesirable plants in prairie and forest range regions. Range research methods.
Textbook: Sampson, *Range Management.*

Advanced and Graduate Courses—

501. Reading Projects in Crop Ecology

WM. G. CORNS

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with a maximum of six hours.

502. Research Projects in Crop Ecology

WM. G. CORNS

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

Field Crops

Senior Course—

354. Pasture Management (0-0; 3-3)

W. E. SMITH

Study of grasses and legumes for pasture and forage, their management and conservation.
Textbook: Hughes, Heath and Metcalf, *Forages.*

Advanced and Graduate Courses—

503. Reading Projects

W. E. SMITH

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with a maximum of six hours.

504. Research Projects

W. E. SMITH

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

Genetics

Senior Courses—

451. Genetics (3-4; 3-0)

J. KUSPIRA AND J. UNRAU

A survey of genetics covering the basic principles and emphasizing the relation of this science to plant and animal improvement, human inheritance and eugenics, medicine, sociology, ontogeny, and organic evolution.
Classroom demonstrations.
Textbook: Altenburg, *Genetics.*
Prerequisite: Botany 201 or Zoology 220. (These prerequisites will be waived in certain cases.)

452. Genetics (3-0; 3-0)

J. KUSPIRA AND J. UNRAU

The lecture part of Genetics 451.
Textbook and prerequisite: The same as for Genetics 451.

453. Genetics Laboratory (0-4; 0-0)

GENETICS STAFF

The laboratory part of Genetics 451.
Statistical bases of common genotypic and phenotypic ratios; breeding experiments with Drosophila and maize, with application of genetic analyses and goodness-of-fit tests to resulting data; student projects.
Prerequisite: Genetics 452.

462. Genetics in Relation to Plant Breeding (3-0; 3-0)

W. E. SMITH AND J. WEIJER

Application of genetic principles to plant breeding; crossing techniques; hybridization and selection methods; production and maintenance of pure seed; field plot techniques; inheritance in important crops; special exercises.
Textbook: Hayes, Immer and Smith, *Methods of Plant Breeding.*
Prerequisite: Genetics 451 or 452.

Advanced and Graduate Courses—

505. Reading Projects in Genetics and Plant Breeding

GENETICS AND PLANT BREEDING SAFF

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with a maximum of six hours.

506. Research Projects in Genetics and Plant Breeding

GENETICS AND PLANT BREEDING STAFF

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

530. Microbial Genetics (0-4; 0-4)

J. WEIJER

An advanced laboratory-conference course dealing with genetics of fungi, bacteria and viruses.
Prerequisite: Genetics 451 or 452.
Prerequisite or corequisite: Biochemistry 300 or 350.

611. Cytology and Cytogenetics (2-3; 2-3)

J. UNRAU, G. W. R. WALKER AND J. KUSPIRA

Lectures and laboratory study of chromosomes, mitosis, meiosis, hybrid cytology, polyploidy, etc.; practice in the preparation of materials for cytological study. Review of recent advances in the fiedls of cytology and cytogenetics.
Prerequisite: Genetics 451 or 452.

612. Advanced Genetics (3-0; 3-0)

L. P. V. JOHNSON AND W. E. SMITH

Lectures, assignments, and conferences affording review and critical study of the advanced theories and recent literature in gentics. Prerequisite: Genetics 451 or 452 (not offered in 1960-61).

Horticulture

Junior Courses—

341. Introduction to Horticulture (0-0; 3-3)

WM. T. ANDREW

Elementary course designed for those students who do not wish specialized instruction in the various phases of horticulture. A survey of world horticulture, with an introduction on propagation, culture, nutrition, and utilization of horticultural plants. Laboratory work in propagation and cultural practices.

352. General Horticulture (3-3; 0-0)

WM. T. ANDREW

A general course in horticulture, with special emphasis on the physiology of horticultural crops. Laboratory practice in systematic horticulture; classification, adaptation, culture, marketing, and preservation of crops; their economic importance and value as foods.

Senior Courses—

456. Landscape Architecture (3-3; 0-0)

R. H. KNOWLES

An introductory course covering: (1) The elements and principles of design; (2) The application of these principles to the arrangement of objects in space; (3) The identification and use of hardy plant materials; (4) Problems in landscape design in which technological, social, and economic requirements are considered in relation to the aesthetics of planning.

457. Floriculture (0-0; 3-3)

R. H. KNOWLES

The principles and practices of growing florist's crops under glass. The effect of environment on growth and development of specific crops.

Advanced and Graduate Courses—

507. Reading Projects in Horticulture

STAFF

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with a maximum of six hours.

508. Research Projects in Horticulture

STAFF

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

509. Selected Topics in Horticulture

STAFF

A course in which the recent developments of special interest to the horticulturist will be discussed at an advanced level, with special emphasis on modern techniques in horticultural research. Credit according to work done, with a maximum of six hours.

Plant Pathology

Senior Courses—

480. Elements of Plant Pathology (0-0; 3-3)

A. W. HENRY AND W. P. SKOROPAD

An introductory study of the nature, cause, and control of plant diseases.
Prerequisite: Botany 201 or 202.

481. Diseases of Field Crops (3-3; 0-0)

A. W. HENRY

Diseases affecting grain, forage, and other field crops.
Prerequisite: Plant Pathology 480.

482. Diseases of Horticultural Crops (0-0; 3-3)

W. P. SKOROPAD

Diseases affecting potato, vegetable, fruit, and ornamental plants.
Prerequisite: Plant Pathology 480.

Advanced and Graduate Courses—

511. Reading Projects in Plant Pathology

A. W. HENRY

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with maximum of six hours.

512. Research Projects in Plant Pathology

W. P. SKOROPAD

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

631. Advanced Plant Pathology (0-3; 0-3)

A. W. HENRY AND W. P. SKOROPAD

Principles of plant pathology, theoretical and applied.
Prerequisite: Plant Pathology 480 or the equivalent.

Plant Physiology and Biochemistry

Senior Course—

477. Cereal Chemistry (0-0; 0-3)

SAUL ZALIK

Lectures and laboratory periods dealing with techniques in cereal chemistry and oil seed processing. Biological, chemical, and physical factors affecting quality; grain grading; methods of analyses; milling, baking; malting and other technological processes.
Prerequisite: Biochemistry 350.

Advanced and Graduate Courses—

513. Reading Projects in Plant Physiology and Biochemistry

A. G. McCalla and Saul Zalik

A course in which individual students select a topic for intensive study in the library and prepare a written report. Regular meetings for discussion. Credit according to work done, with a maximum of six hours.

514. Research Projects in Plant Physiology and Biochemistry

A. G. McCalla and Saul Zalik

Investigation of special problems involving field or laboratory study. Credit according to work done, with a maximum of six hours.

620. Plant Morphogenesis (2-2; 2-2)

Saul Zalik

An experimental approach to growth and differentiation in plants. Topics dealt with are: growth correlations; tissue culture; differentiation and regeneration; growth regulators and metabolites; external and internal factors.

Prerequisites: Biochemistry 350, Botany 320, Genetics 451 or 452.

PUBLIC SPEAKING

Junior Courses—

100. (0-2; 0-0)

C. F. Bentley

A series of lectures on essentials and procedures in public speaking followed by student participation through the medium of short talks to be given during the session. There may be occasional lectures by outside speakers.

200. (0-1; 0-1)

C. F. Bentley

A continuation of Public Speaking 100.

SOIL SCIENCE

Staff:

Professor and Head—J. A. Toogood.

Professor—C. F. Bentley.

Assistant Professors—D. L. Lynch, J. A. Robertson,* S. Pawluk, G. R. Webster.

Junior Courses—

340. Introduction to Soil Science (3-3; 3-3)

Department Staff

A general introductory course in soil science. Soil formation, classification, composition, micro-organisms, air, moisture and temperature relationships. Yields as affected by fertility, rotations, and different sys-

*On leave of absence.

tems of farming. Manures and fertilizers. Elementary soil physics and chemistry. Suitable tillage, conservation, and management of soils in Alberta.

Textbook: Lyon, Buckman, and Brady, *The Nature and Property of Soils*. 5th edition.

Prerequisite or corequisite: Chemistry 230.

Senior Courses—

420. Soil Classification (3-3; 0-0)

S. Pawluk

Soil genesis, morphology and classification with emphasis on Canadian interests. Soil survey reports, their interpretation and use. Proper use and conservation of Alberta soils.

Prerequisite: Soil Science 340, or permission.

430. Soil Microbiology (0-0; 3-3)

D. L. Lynch

Soil micro-organisms and factors influencing their activity; decomposition of crop residues and manures; nitrogen fixation and preservation; effect on insoluble plant foods.

Textbook: Wakman, *Soil Microbiology*.

Prerequisite: Microbiology 360.

460. Soil Fertility (3-3; 0-0)

J. A. Robertson

Sources of plant nutrients in the soil; nutrient availability as affected by soil conditions; soil colloids and ion exchange; fertilizer materials; methods of assessing soil fertility; soil fertlity studies in Alberta and at other experimental stations.

Prerequisite: Soil Science 340.

470. Irrigation and Drainage (0-0; 3-3)

J. A. Toogood

Character of soil and water used for irrigation; methods of irrigation; measurement and distribution; duty; time and amount of application; removal of excess water; control of alkali; irrigation practices for various crops and soils; effects of fertility.

Textbook: Israelsen, *Irrigated Soils*.

Prerequisite: Soil Science 340.

Advanced and Graduate Courses—

501. Special Topics and Problems

A course in which the individual student selects a topic or problem for intensive study and prepares a written report. Regular meetings for discussion, and credits up to a maximum of six hours.

520. Chemical Methods as Applied to Soil Research (1-3; 0-0)

D. L. Lynch

The research approach to soil chemistry. A minor research problem may be assigned as the principal part of the term's work.

530. Physical Methods as Applied to Soil Research (0-0; 1-3)

J. A. Toogood

Physical properties of soils as they relate to mechanical composition, consistency, structure, aeration, tillage, erosion, and other factors affecting plant growth. The nature and properties of soil colloids. Textbook: L. D. Baver, *Soil Physics.*

631. Seminar (1-0; 1-0)

Reports by students and instructors on the literature of selected topics, with class discussion. Required of all graduate students.

ZOOLOGY

225. Elementary Comparative Anatomy (0-0; 3-3)

Comparative anatomy of the vertebrates, with special reference to mammals; parasitic invertebrates; development and evolution.

IX

The Faculty of Commerce

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

Purpose of the Commerce Curriculum

The curriculum of the Faculty of Commerce is based on two beliefs:

1. Education for business management is a life long process.
2. Universities can make their greatest contribution to this process by teaching the disciplines and fields of knowledge which underlie the practice of business. Details of current business practice, though important, can best be taught by business itself and learned through experience.

Business and its environment have changed enormously in the last twenty years and will change at an even faster pace in the next twenty. No school of business can possibly teach the solution of problems which will arise twenty years from now. A school should provide the best possible basis for effective life-long learning through actual experience. The School should not ask, "What should the businessman know?" but rather "Of all things he should know, what are best taught in the few years of academic, professional education?" Universities should teach the broad underlying fields of knowledge which are basic to business, and should treat the fields of business practice in comprehensive analytical framework, rather than teach recent or current business practice. Alfred North Whitehead, British philosopher and noted educator, stated this theory in simple words when he said that a properly educated man ". . . will remember by an unconscious common sense how to apply principles to immediate circumstances." In the first two years of the program, the student will take courses in the basic disciplines. Later he will be taught how this basic knowledge may be applied most effectively to the solution of the various problems of business in a general program or in a specialization of his choice which may be selected from the fields of economics, accounting, marketing, production, finance or personnel administration.

The Faculty of Commerce is proud to number among its graduates many individuals now holding positions of trust and leadership in the Canadian business world. A review of the present activities of graduates since the Faculty was organized in 1928 indeed indicates a wide diversity of occupations.

Practical Experience Qualifications

Students must satisfy the Faculty that they have had some practical business experience before they will be allowed to graduate. This experience may have been obtained before entering university. If it has not, then arrangements should be made to get it during the summer months. The equivalent of two full summers of practical experience (nine months) will be required.

In February of each year an opportunity will be given to students to present themselves before a Committee under the direction of the Dean to outline the work which they have done or intend to do to meet the practical experience qualifications. This should be done before the end of the Second Year.

Advisory Committee to the Faculty of Commerce

To keep staff and students informed about latest trends in business and industry, a group of active leaders in the administration and direction of business enterprises have been invited periodically to meet with the Academic staff of the Faculty.

These members are appointed by the Board of Governors upon nomination by the President of the University.

Mr. Ian Angus, General Manager, Canadian Sugar Factories Ltd.
Mr. A. G. Bailey, Vice-President and General Manager, Bailey-Selburn Oil and Gas Ltd.
Mr. A. T. Baker, General Manager, Alberta Wheat Pool.
Mr. S. Belzberg, President, Belzberg Enterprises Ltd.
Mr. J. A. Cranstoun, Manager, Bank of Nova Scotia.
Mr. D. S. Harvie, General Manager, Western Leaseholds Ltd.
Mr. G. R. Heffernan, Managing Director, Premier Steel Mills Limited.
Hon. E. W. Hinman, Provincial Treasurer.
Mr. Howard Kelly, Vice-President and Secretary, Burns and Company Ltd.
Mr. J. C. Langford, Plant Manager and Vice-President, Canadian Chemical Company Ltd.
Mr. M. Marvin, General Manager, The Life Insurance Company of Alberta.
Mr. James A. Scott, President, Pembina Pipe Lines Ltd.
Mr. T. Sissons, Production Manager, Medicine Hat Brick and Tile Company Ltd.
Mr. M. E. Stewart, General Manager, Northwestern Utilities Ltd.
Mr. N. E. Tanner, President, Trans-Canada Pipelines.
Mr. I. Telmer, Manager, Hudsons Bay Company
Mr. L. W. White, Division Manager, Imperial Oil Ltd.
Mr. M. Wolfe, General Manager, Edmonton Motors Ltd.
Mr. W. S. Ziegler, Executive Vice-President, Inland Cement Company.

Calgary

The University offers in Calgary the first year of the course leading to the degree of Bachelor of Commerce.

(2) **ADMISSION REQUIREMENTS**

Students from Alberta high schools seeking admission to the School of Commerce will be required to present:

(a) a High School Graduation Diploma with
(b) "B" or higher standing in the following Grade XII examination subjects:
1. English 30,
2. Social Studies 30,
3. Mathematics 30,
4, 5 and 6. *Three* of:
Chemistry 30,
Physics 30,
Biology 32,
French 30 or German 30 or Latin 30; and

(c) an average in these six courses of at least 60%.

Candidates from outside Alberta will be required to meet equivalent standards and should submit their documents to the Registrar of the University for evaluation. A fee of five dollars is charged for this service.

NOTE: *Students* who completed Grade XII in 1954 or earlier will be given full consideration for admission. They are advised to write to or see the Registrar of the University and to provide a complete transcript of their high school records.

(3) PROMOTION AND GRADUATION

Faculty of Commerce

1. Promotion of the student from the first to the second year is contingent on the satisfactory completion in one year of a first year program of normal wegiht. The regulation applies also to students transferring from other universities.
2. For students in the three year program, six courses must be passed with at least second-class standing, of which four must be courses taken in the second and third years.

   For students in the four year program eight courses must be passed with at least second-class standing, of which at least four must be courses taken in the third and fourth years.
3. In the three year program, any student failing to obtain a second-class standing in Accounting 300 will be permitted to write a special examination in this course in the spring of the year following that in which the course was taken.

(4) ACADEMIC HONORS

First Class Standing

First-class standing in a given year is awarded to any student who secures an average mark of not less than 80% in the work of that year.

First Class General Standing

First class general standing will be awarded to, and will be inscribed upon the degree parchment of any student who secures first-class standing in the three years of the program. This applies only to students in the three year program.

For students in the four year program, regulations concerning first class general standing will be announced at a later date.

(5) PROGRAMS OF STUDY

New Four Year Program

The new curriculum in the Faculty of Commerce is based upon a four year program. During the third and fourth years of the program the student may pursue a general course or may major in Economics, Accounting, Personnel Finance, Production or Marketing. The third and fourth years are subject to change.

The student's attention is directed to the fact that certain of these majors require credit in a particular course in the second year.

Students who select a major area of study may expect to have that fact noted on their graduation diploma.

Courses in the first two years of the program are offered from time to time in the Summer Session and Evening Credit Program. The final two years of the program may be taken only in the regular Winter Session.

All Programs

First Year

Accounting 200
Business 200
Economics 200
English 210
Junior Arts and Science Option*
Physical Education

Second Year

Business Law 310
Psychology 220
Statistics 354
An approved course in Accounting, Mathematics, Economics or Sociology
Arts and Science Option*

General Course

Third Year

Finance 300
Marketing 300
Personnel 300
Production 300
Arts and Science option*

Fourth Year

Accounting 340
Business 400
One approved course in Mathematics, Economics, Psychology, Marketing, Production, Finance or Personnel
Two Arts and Science options*

Major in Accounting

(Open only to Students with credit in Accounting 300)

Third Year

Accounting 410
Accounting 420
Business 300
One of Economics 300, 340, or 380
An Arts and Science option*

Fourth Year

Accounting 430
Accounting 440
Business 400
One of Economics 300, 340, 380, Marketing 300, Production 300 or Personnel 300
*Arts and Science Option

*Any general course in the Faculty of Arts and Science.

Major in Economics

(Open only to students with credit in Economics 300)

Third Year

Economics 340
Economics 380
Mathematics 200 or 201
One of Finance 300, Production 300, Marketing 300 or Personnel 300
*Arts and Science Option

Fourth Year

A Senior Economics Course
Business 400
One of Business 450 or 460
Accounting 340
*Arts and Science Option

Major in Finance

(Open only to students with credit in Economics 340)

Third Year

Finance 300
One of Production 300, Marketing 300 or Personnel 300
Accounting 300
Mathematics 250
*Arts and Science option

Fourth Year

Two of: Finance 400
Finance 410
Finance 420
Finance 430
Business 400
Economics 350 or 380
*Arts and Science option

Major in Marketing

Third Year

Marketing 300
One of Production 300, Finance 300 or Personnel 300
Psychology 320
A course in Statistics
*Arts and Science option

Fourth Year

Three of: Marketing 400
Marketing 410
Marketing 420
Marketing 430
Marketing 440

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*Any general course in the Faculty of Arts and Science.

Business 400
*Arts and Science option

Major in Personnel

(Open only to students with credit in Sociology 202)

Third Year

Personnel 300
Personnel 310
One of Finance 300, Marketing 300 or Production 300
Psychology 320
*Arts and Science option

Fourth Year

One of: Personnel 400
Personnel 410
Personnel 420
Business 400
One approved course in Psychology
Sociology 460
*Arts and Science option

Major in Production

(Open only to students with credit in Accounting 300)

Third Year

Production 300
One of Personnel 300, Finance 300 or Marketing 300
Economics 300
Mathematics 200 or 201
*Arts and Science option

Fourth Year

Two of: Production 400
Production 410
Production 420
Production 430
Business 400
Accounting 420 or 440
*Arts and Science option

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*Any general course in the Faculty of Arts and Science.

Bachelor of Commerce with Honors

The Faculty is presently considering an Honors program and should it be approved, students registering in 1960 will have an opportunity to register in it.

Previous programs in Honors Business Administration and Honors Political Economy will no longer be offered.

Combined Course—B.A. and B. Com.

The combined B.A., B.Com. program will not be offered in the 1960-61 session. Those students who have already registered for this combined course are advised to plan the remainder of their programs in consultation with the Dean of the Faculty.

Former Three Year Program, Bachelor of Commerce

For students registered in the Commerce pattern prior to September 1960, the following program outline is applicable to complete the three year degree program:

Second Year

Business 300—Administrative Principles (was Bus. Adm. 300)
Business Law—Commercial Law (was Bus. Adm. 310)
Marketing 300—Marketing Fundamentals (was Bus. Adm. 320)
Accounting 300—Intermediate Accounting
Economics 340—Money and Banking
Open Arts and Science option

Third Year

Required Courses:
Business 400—Business Policy (was Bus. Adm. 400)
Finance 300—Business Finance (was Bus. Adm. 430)
Production 300—Production Fundamentals (was Bus. Adm. 440)
Open Arts and Science Option

(a) Accounting Option
Accounting 400—Auditing and Advanced Accounting
Accounting 410—Financial and Accounting Controls

(b) General Business Option
Personnel 300—Human Relations
Personnel 310—Industrial Relations
Marketing 400—Retailing; Wholesaling
Marketing 420—Advertising; Sales Promotion

(c) Economics Option
Any two approved courses in Economics

(6) DETAILS OF COURSES

The university reserves the right to modify or withdraw for the session any of the courses here outlined.

Students are reminded that regular attendance is expected in all courses.

NOTE: The weekly hours of instruction for both terms of the winter session are set out at the top of each course description. The first figure in each term indicates lecture-hours and the second laboratory-hours.

STAFF

Professors—J. D. Campbell, Hu Harries.
Associate Professor—D. Goodale.
Assistant Professors—J. D. Kyle, W. A. Preshing, A. S. Rankin
Lecturer—K. J. Arthur
Sessional Lecturers (Calgary)—R. C. Berglund, R. P. Alger.

ACCOUNTING

200. Elementary Accounting (3-2; 3-2)

J. D. CAMPBELL AND OTHERS

This course is designed to present the language of accounting to the student. The course is devoted to the mechanics of account and their application to specific conditions which arise in the business world. Attention is directed to the characteristics of the various forms of business organizations and the accounting implications from the standpoint of legal as well as managerial requirements.

300. Intermediate Accounting (3-2; 3-2)

J. D. CAMPBELL AND OTHERS

This course is a continuation of Accounting 200 and covers an examination of basic accounting theory involving accounting standards and their application to specific business conditions.

An intensive study is made of the partnership and limited company form of business organization and those particular aspects which are peculiar to these types of organizations both from a legal and management standpoint.

340. Managerial Accounting (3-0; 3-0)

This course will cover accounting from the standpoint of management and its application to the topics of accrual accounting, statement presentation, budgeting, source and application of funds, overhead distribution, direct costing, use of standards, project planning, planning capital acquisition, taxation, inventory valuation and depreciation.

(Not offered 1960-61)

400. Auditing and Advanced Accounting (3-2; 3-2)

J. D. CAMPBELL

(This course for three-year program students only)

The course provides for study in the field of auditing and advance work in accounting with special attention to cost accounting. The first part of the course is devoted to a study of the systems of internal check, the functions of the internal and external auditors and the audit procedure generally.

410. Financial and Accounting Controls (3-0; 3-0)

D. GOODALE

(This course for three-year program students only)

The content of the course will cover:

(a) The characteristics of the basic financial statements reflecting both past and proposed activities; interpretation of the internal and external sources of funds and illustrations of the flow of capital in operations.

(b) The contemplation, determination and control of costs, expenses and income.

(c) The examination of published financial statements from the standpoint of analysis and interpretation.

The course will cover the accounting language from the standpoint of management and its application to the topics of accrual accounting, statement presentation, budgeting, source and application of funds, overhead distribution, direct costing, use of standards, project planning, planning capital acquisition, taxation, inventory valuation and depreciation. Textbook: Management Accounting.

411. Advanced Accounting Theory and Problems (with Lab) (3-2; 3-2)

The course covers an examination of the basic accounting concepts and their application to specific accounting areas of business policy with special attention to inventory valuation, depreciation, revenue realization and statement presentation. Consolidation, mergers, refinancing and recapitalization will be considered in detail. Trustee accounting will be examined including areas of executorship trusts, bankruptcy, and legal accounting.
(Not offered in 1960-61)

420. Cost Accounting (3-2; 3-2)

The course will cover an examination of cost accounting techniques with special attention to the areas of job and process costs, joint and by product costs, estimated costs, standard costs, distribution costs, and their specific relationship to the industry pattern in Alberta.
(Not offered in 1960-61)

430. Auditing and Business Investigation (3-0; 3-0)

The auditing section of the course will be devoted to an examination of auditing standards and their practical application.
Business investigation will examine the areas of refinancing, purchase of a business, credit ratings, fraud or embezzlement and the analysis of operating results with a view to improvement.
(Not offered in 1960-61)

440. Advanced Managerial Accounting and Income Tax (3-0; 3-0)

The course will cover the accounting language from the standpoint of management and its application to the topics of accrual accounting, statement presentation, budgeting, source and application of funds, overhead distribution, direct costing, use of standards, project planning, planning capital acquisitions, inventory valuation, and depreciation.
(Not offered in 1960-61)

BIOLOGY

MEMBERS OF THE DEPARTMENTS OF BOTANY AND ZOOLOGY

341. General Biology (3-2; 3-0)

Introduction to the plant and animal kingdoms; organization and development of plants and animals; adaptation to environment; variations, heredity and selection; evolution and origin of species; history of biology; and human welfare.

NOTE: This course is not open to first year students and may not be taken

for credit by students who already have taken Botany 1a, 1b or 201, or Zoology 1 or 220.

BUSINESS

200. Introduction to Business (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

Survey of the place of business in modern society.

300. Administrative Principles (3-0; 3-0)

J. D. KYLE

Functions of management-planning, organization, staffing, directing, controlling. Prerequisite: Business 200.

400. Business Policy (3-0; 3-0)

DR. HU HARRIES

A study of policy-making in business, government and social fields with emphasis upon the application of the principles and techniques, acquired in the basic courses, to comprehensive problems.

450. Appraisal and Assessment (3-0; 3-0)

Techniques and principles governing the valuation of real and personal property for commercial and tax purposes.
(Not offered in 1960-61)

460. Real Estate; City and Regional Planning (3-0; 3-0)

Buying, selling, building and managing property. Redevelopment, zoning and land use planning in urban and rural areas.
(Not offered in 1960-61)

BUSINESS LAW

310. Commercial Law (3-0; 3-0)

W. H. HURLBURT

An introduction to the study of Commercial Law with special reference to the law of contracts; Bills of Sale, Chattel Mortgages and conditional sales; sales of goods; bulk sales; contracts of hiring; contracts of carriage including bills of lading; negotiable instruments; guarantees; real property; commercial associations including companies, partnership and agency; master and servant.

ECONOMICS

MEMBERS OF THE DEPARTMENT OF POLITICAL ECONOMY

200. Principles of Economics (3-0; 3-0)

A general introduction to the study of the tendencies underlying the wealthgetting and wealth-using activities of man.

300. Intermediate Economic Analysis (3-0; 3-0)

An intensive study of the theory of value and the theory of distribution, with applications to public policy. Prerequisite: Economics 300 or 302.

320. International Trade (3-0; 3-0)

The basis of international trade, gains from trade, the balance of pay-

ments, foreign exchange rates, trade and national economic welfare, problems involved in trade, restrictive government policies, post World War II attempts to broaden trade and investment. Prerequisite: 200 or 302.

340. Money and Banking (3-0; 3-0)

The principles of money; monetary systems, commercial banking, central banking, monetary theory and policy, foreign exchange. Prerequisite: Economics 300 or 302.

350. Public Finance and Taxation (3-0; 3-0)

Public expenditures, budgets, budgetary legislation, fiscal policies, taxation, public credit, intergovernmental fiscal relationships. Prerequisite: 200 or 302.

380. National Income Analysis (3-0; 3-0)

National Income concepts and accounting; stability characteristics of the national income and related concepts over time; business cycle theories and investigations. Prerequisite: 200 or 302.

ENGLISH

MEMBERS OF THE DEPARTMENT OF ENGLISH

210. English Language and Literature (3-0; 3-0)

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.

Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rhinehart); Shaw, *Saint Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

394. English Literature of the North American Continent (3-0; 3-0)

American literature, with special attention to writers who have made original contributions to English literature generally. A brief survey of Canadian literature will conclude the course.

FINANCE

300. Business Finance (3-0; 3-0)

J. D. KYLE

An introductory course designed to present the point of view of the chief financial officer of a company with regard to financial decision making and administration of a going concern.

400. Insurance Principles: Municipal and Public Insurance Management (3-0; 3-0)

The nature of risk and uncertainty; methods of meeting risk; the insurance mechanism.

Public liability, hospital, utility, performance bonds and other types of public insurance.
(Not offered 1960-61)

410. Investment Principles; Security Analysis (3-0; 3-0)
Theories of investment with special reference to types of securities, prices and market operation.
Analytical techniques in the selection of securities.
(Not offered 1960-61)

420. Insurance Management; Estate Planning (3-0; 3-0)
The nature and use of life insurance; property and casualty insurance; special indemnity.
Current estate planning practice.
(Not offered 1960-61)

430. Financing Small Business; Credit and Collection (3-0; 3-0)
The special problems of capital and current financing of small business. The use of credit; personal loans; commercial banking; collection procedures and costs.
(Not offered in 1960-61)

GEOGRAPHY

302. Economic Geography (3-0; 3-0)
A. H. Laycock
A study of the distribution of economic activities over the world. Resources, industries, and trade patterns are reviewed systematically and in place.

406. Western Canada (3-0; 3-0)
A. H. Laycock
A study of the resources, patterns of development and regions of Western Canada. The emphasis will be upon the developed parts of the Prairie Provinces and British Columbia.

410. Geography in Planning (2L-1s; 2L-1s)
This course will cover selected historical, theoretical and practical aspects of land use planning in various parts of the world. Physical and cultural aspects of planning projects and problems will be considered; techniques appraised.
Prerequisite: Consent of the instructor.

HISTORY

Members of the Department of History

210. Canada and the United States, (1492-1939) (3-0; 3-0)
A history of Canada and the United States, including a study of their European origins and relationships.

370. Canada (3-0; 3-0)
A survey of the political and social history of Canada.

MARKETING

300. Fundamentals of Marketing (3-0; 3-0)

W. A. Preshing

The study of Marketing procedures, product policy, distribution channels, advertising, pricing, sales administration and marketing management.

400. Retailing; Wholesaling (3-0; 3-0)

W. A. Preshing

The study of merchandising policies, pricing, buying, controlling, promotion, personnel, store systems and plant operation. A study of the wholesaling function; use of agents and jobbers.

410. Sales Management: Public Relations (3-0; 3-0)

A study of the organization and management of a Sales Division. The use of public relations as a marketing management tool with special emphasis upon the ethical and social aspects.
(Not given in 1960-61)

420. Advertising: Sales Promotion (3-0; 3-0)

W. A. Preshing

A study of the chief forms of advertising and its use with special attention on media strategy, lay-out campaigns and evaluation. The consideration of sales promotion methods as an intricate part of Marketing management co-ordinated with personal selling and advertising.

430. Purchasing; Market Research (3-0; 3-0)

A study of purchasing organizations and their practices; quality source selection, lease-backs and industrial promotional policies. A study of the principles of Market Research combined with class research projects.
(Not given in 1960-61)

440. Transportation; Traffic Management (3-0; 3-0)

A study of the principles of transportation together with the detailed examination of regulations and rate structures, organization and the public utility concept.
The movement of merchandise by public and private carrier; functions of the traffic department; rate schedules and analysis.
(Not given in 1960-61)

MATHEMATICS

Members of the Department of Mathematics

200. Elementary Mathematics (6-0; 6-0)

As Mathematics 201 (below) with the addition of plane trigonometry and solution of triangles. Additional text: Holmes, *Trigonometry.* This course is intended for students who wish to have a basic course in Mathematics, acceptable as a prerequisite for Mathematics 304, but who do not have Mathematics 31 of High School. Prerequisite: Mathematics 30 of High School.

201. Elementary Mathematics (3-2; 3-2)

Rates of change, differentiation and integration of simple functions. Applications. Analytic geometry of the conic sections. Exponential, logarithmic and trigonometric function.

250. Theory of Finance (3-0; 3-0)

Application of percent, interest, annuities certain, sinking funds and amortizations, valuation of bonds, depreciation, life annuities and life insurance. Textbook: Stelson, *Mathematics of Finance.*

MODERN LANGUAGES

MEMBERS OF THE DEPARTMENT OF MODERN LANGUAGES

French

200. First Year University French (3-1; 3-1)

This is an intensive course in reading modern French, French Grammar and composition. Prerequisite: Grade XII French or French 100 or 1.

German

200. Beginner's German (3-2; 4-1)

This course is designed to impart, on the introductory level, an active, practical skill in the use of the spoken and written word. The oral approach will be stressed, using material from everyday life situations, easy cultural readers, slides, charts, maps etc. The Department's language laboratory will be available to students for individual practice.

Russian

200. Beginner's Russian (Arts Section) (5-0; 5-0)

This course is elementary and is designed to give a working knowledge of the Russian language. It provides a study of the essentials of grammar, reading, and drill on useful expressions.

Spanish

100. Beginners' Spanish (5-0; 5-0)

A first course in Spanish grammar and pronounciation; an introduction to Spanish and Latin culture.

PERSONNEL

300. Human Relations (3-0; 3-0)

K. J. ARTHUR

A detailed study of work environment, motivation and morale and their influence on productivity. The practices and techniques of personnel management will be examined in terms of their effects on the organization and its employees.

310. Industrial Relations (3-0; 3-0)

K. J. ARTHUR

Labor Problems; Theory of Wages, methods of wage payment; hours of labor; real wages and standards of living; social security; unemployment; labor organization; collective bargaining; labor legislation.

400. Government Personnel Administration; The Transitional and Migratory Worker (3-0; 3-0)

The special problems of personnel administration at the municipal, provincial and federal levels.

The special personnel problems of immigrant labor, the migratory worker and unskilled labor.

(Not offered in 1960-61)

410. The Labor Union: Social Security (3-0; 3-0)

Labor unions with particular reference to personnel administration in industry.

Unemployment insurance, pensions, group insurance and other employee benefits.

(Not offered in 1960-61)

420. Advanced Personnel Administration (3-0; 3-0)

An intensive examination of procedures for employee recruitment, selection, placement and training; job evaluation, merit rating, wage structure and employee communications.

(Not offered 1960-61)

PHYSICAL EDUCATION

MEMBERS OF THE DEPARTMENT OF PHYSICAL EDUCATION

Phys. Ed. 218. (1M) Recreational Activities (0-2; 0-2)

Emphasis on the fundamentals of the following recreational activities; Touch football, Borden ball, volleyball, badminton, basketball, tumbling and golf, and aquatics. Course required of all first-year men.

Phys. Ed. 228. (2W.) Recreational Activities (0-2; 0-2)

Emphasis on the fundamentals of the following recreational activities; Tennis, aquatics, badminton, volleyball, basketball, social dancing and golf. Course required of all first year women.

PHYSICAL SCIENCE

341. Physical Science (3-0; 3-0)

A course designed for B.A. and B.Ed. students to give them some appreciation of fundamental ideas and methods in the physical sciences, of modern trends in this field, and of its relation to other disciplines. Illustrative material will be taken from Physics, Chemistry, Astronomy and Geology, and the history and development of the subject will be stressed.

NOTE: This course is not open to first year students and may not be taken for credit by students who have already taken Physics 1 or 36 or 100 or 200.

POLITICAL SCIENCE

MEMBERS OF THE DEPARTMENT OF POLITICAL ECONOMY

200. Elements of Political Science (3-0; 3-0)

A study of the principles and practices of modern government, with emphasis on the democratic constitutional state. Among the topics

studied are the nature and theory of the state; types of constitutions; the functions and composition of the legislature, executive and judiciary; representation; political parties and pressure groups.

310. History of Political Thought (3-0; 3-0)

A historical survey of political philosophy; especially in the modern period. A discussion of some of the main problems in the theory of the state, with selected readings from the outstanding thinkers, especially since Hobbes.

320. Government of Canada (3-0; 3-0)

A study of the structure and functioning of the government of Canada, especially of the Commons, the Senate, the Cabinet System, the Civil Service; and the role of political parties.

PRODUCTION

300. Fundamentals of Production and Industrial Organization (3-0; 3-0)

A study of the problems encountered and the techniques used in establishing production enterprises; the management function together with the principles and practices of input and output analysis.

400. Methods Analysis (3-0; 3-0)

A detailed study of time and motion techniques and methods of quality control. (Not offered in 1960-61)

410. Plant Location and Layout (3-0; 3-0)

Factors influencing plant location; the design and layout of plant facilities; planning and execution. (Not offered in 1960-61)

420. Industrial Safety; Factory Management (3-0; 3-0)

Techniques, costs, government regulations affecting plant safety. The operation and administration of factory operation at the supervisory level. (Not offered in 1960-61)

430. Advanced Organization and Control (3-0; 3-0)

Advanced problems in planning and controlling production operations with particular reference to agriculture, the petroleum industry and forest products. (Not offered in 1960-61)

PSYCHOLOGY

MEMBERS OF THE DEPARTMENT OF PYCHOLOGY

220. Psychology Applied to Business and Industry (3-0; 3-0)

L. WILSON

A survey of problems, methods and principles in several fields of psychology with particular reference to the field of business and industry.

320. Psychology Applied to Business and Industry (3-0; 3-0)

L. WILSON

Methods and results of psychological studies in such fields as:
(a) selection, placement, training and supervision of personnel;

(b) promotion of efficiency and safety in production;
(c) advertising, selling and consumer research.

SOCIOLOGY

MEMBERS OF THE DEPARTMENT OF PHILOSOPHY AND SOCIOLOGY

202. Introductory Sociology (3-0; 3-0)

The sociological study of society, social institutions, group behaviour, personality formation and social change.

320. Social Problems (3-0; 3-0)

The analysis of social and personal disorganization in relation to social change, culture conflict and value systems.

460. Social Organization (3-0; 3-0)

Theories of social organization, analysis of such forms of social organization as kinship groups, bureaucracy, economic systems, science, etc., and their interrelationship in functioning social systems. Prerequisite: a first course in sociology.

STATISTICS

MEMBERS OF THE DEPARTMENT OF MATHEMATICS

354. Statistics (3-3; 3-3)

Graphs, tables, diagrams, Frequency distribution, averages, dispersion, skewness. Moments, normal law, regression, simple correlation, applications to data in various fields. Sampling methods, time series, seasonal and cyclical variations, index numbers, tests of significance.
Textbook: Kenny and Keeping, *Mathematics of Statistics*, Part I (van Nostrand.) Prerequisite: Mathematics 30 of High School.

X

The Faculty of Dentistry

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

The dental clinic is located in the East wing of the Medical Science Building. It affords the student an opportunity to perform his clinical requirements under conditions very similar to those of private practice.

Lectures and laboratory instruction in such subjects as Anatomy, Histology, Chemistry, Biochemistry, Physiology, Pathology, Bacteriology, Medicine, Surgery, General Anaesthesia, and Pharmacology are taken in those departments. In addition to bedside and operating clinics in Medicine and Surgery, the senior students are assigned to the dental department at the University Hospital and to the department of General Anaesthesia. This affords the student an opportunity to appreciate the relationship between his field and that of the medical profession.

The University Hospital is located two blocks from the other University buildings. It has its dental staff, and dentistry is represented on the hospital advisory board.

Graduates in Dentistry from the University of Alberta may register in the Province of Alberta upon payment of a licensing fee. They are also eligible to write the examinations of the National Dental Examining Board of Canada, providing they have taken all their training in schools recognized by the Council on Dental Education, Canadian Dental Association. They are also eligible to write licensing examinations in some of the states in the United States and the National Board Dental Examinations of the American Dental Association.

The school is approved by the Council of Dental Education of the Canadian Dental Association and the American Dental Association.

Library

Within the Rutherford Library is a Medical Sciences Reading Room which contains medical and dental books and periodicals.

A dental library committee made up of the Librarian, members of the faculty and representatives of the profession is responsible for keeping the book collection up-to-date.

In addition to the reference materials and textbooks on Dentistry, the reading room contains over 60 current dental journals to which the library subscribes annually. A copy of the "Index to Dental Periodical Literature" is available to assist the librarian, students and the profession in locating information upon any subject. It is an index to all dental periodicals published since 1839.

Student Guidance

First-year students will be assigned to a Faculty consultant, who will act as their special counsellor during the first year of their University course. These counsellors are appointed by the Dean of the Faculty.

Approximate Cost of Books and Instruments

**Textbooks*:

First year	$125.00
Second year	145.00
Third year	125.00
Fourth year	20.00

Expendable instruments and supplies:

First year	$300..00
Second year	390.00
Third year	220.00
Fourth year	250.00

*Approximate figures.

Students should budget for additional supplies which they are required to purchase from time to time.

Students are not compelled to purchase books or instruments from sources indicated, but they must comply as to quality, and in the case of books—latest editions.

Physical Examination

All students entering the University of Alberta for the first time are required to take a physical examination at the time of registration.

Students entering first-year Dentistry are required to provide a certificate signed by themselves and a physician giving the details of their physical condition.

(2) ADMISSION REQUIREMENTS

Matriculation

Students from the high schools of Alberta seeking admission into the Faculty of Arts and Science for Dentistry will be required to present:

(a) A High School diploma with

(b) "B" or higher standing in:

1. English 30,
2. Social Studies 30,
3. Mathematics 30,
4. Chemistry 30,
5. Physics 30,
6. French 30 or German 30 or Latin 30;

(c) an average in these six courses of at least 60%.

Candidates from outside Alberta will be required to meet equivalent standards.

NOTE: Students who completed Grade XII in 1954 or earlier will be given full consideration for admission. They are advised to write or see the Registrar of the University and to provide a complete transcript of their high school records.

For the Degree of D.D.S.

The above, plus at least one year in the Faculty of Arts and Science, constitutes matriculation into the first year of Dentistry, leading to the degree of D.D.S.

All students wishing to enter the first professional year of Dentistry are required to make application on or before May 15. Residents outside Canada must

make application on or before April 15. A student procceeding towards a first degree will normally be required to attend at least one academic year as a full-time student. In general, consideration for admission to the limit of available accommodation will be given to those students with an average of at least 65% in all courses taken after senior matriculation.

It must be distinctly understood that no student can be guaranteed admission to Dentistry on the basis of academic standing alone. Before final acceptance any applicant may be required to satisfy representatives of the faculty at a personal interview. The possession of personal qualities necessary for successful practice will be stressed. Further, any student whose performance in the work of any professional year is unsatisfactory to the Faculty will not be permitted to continue in the study of Dentistry.

Registration

Before beginning the study of Dentistry, any student wishing to practise in Alberta should write to the registrar of the Alberta Dental Association, Dr. R. A. Rooney, Tegler Building, Edmonton, for information regarding a license to practise. Those wishing to practise in any other province should secure from the dental registrar of that province all information respecting the practice of dentistry. In some instances an enabling certificate is required before beginning the course of studies.

Enrolment in any faculty or school must necessarily be limited to the number of students who can be accommodated. Students are normally accepted in the order of their academic standing from among the whole list of applicants.

Students, therefore, should never come to the University until they have received an official acceptance of their application.

(3) PROMOTION

1. A student in the course leading to the degree D.D.S. must pass all subjects and obtain an average of at least 65% in the work of the pre-professional year, in the Faculty of Arts and Science, before proceeding to the course in Dentistry.
2. Dentistry is on a year system; students must complete each year before being promoted.
3. No student is permitted to repeat first-year Dentistry.
4. Students in the Faculty of Dentistry are required to obtain a mark of 50% in each written paper and an average of 60% in all written papers.
5. In those courses in Dentistry in which a mark for practical work is given, such marks shall be not less than 50% in each course, and the average for all practical marks shall not be less than 60%.
6. In most practical courses the marks are based on the year's work, and therefore any student who does not meet the practical requirements automatically fails the year.

(4) PROGRAM OF STUDY

The Program Leading to the Degree of D.D.S.

A student may not enter this course unless (a) he has obtained an average of at least 60% in senior matriculation; (b) his registration is approved by the Faculty of Dentistry.

The basic minimum pre-professional requirements for the course leading to the D.D.S. degree are: one full year of college work after senior matriculation including full college courses in Physics, Inorganic Chemistry, and Zoology.

The subjects in the pre-professional year in the Faculty of Arts and Science are:

Physics 200,	Zoology 220,
Chemistry 230,	One A or B option,
Physical Education,	One approved option.

Prescription of Courses

FIRST YEAR

Subjects	Course No.	First Term Lect.	First Term Lab.	Sec. Term Lect.	Sec. Term Lab.
Anatomy—					
General and Special	Anat. 412	...	...	3	6
Microscopic	Anat. 416	3	6	2	4
Oral Anatomy	Dental Anat. 413	2	3	...	...
Oral Anatomy	Dental Anat. 414	...	...	1	3
Organic Chemistry	Chem. 350	3	3	3	3
Full Denture Prosthesis	Dent. 410	1	3	1	3
Dentistry in Public Health	Dent. 411	...	...	1	...
Bacteriology	Bact. 412	3	3	1	3
Dental Materials	Dent. 419	1	3	...	...
Orientation and History of Dentistry	Dent. 417	1	...	...	...

SECOND YEAR

Subjects	Course No.	First Term Lect.	First Term Lab.	Sec. Term Lect.	Sec. Term Lab.
Biochemistry	Biochem. 411	3	3	3	3
Anthropology	Anat. 421	...	...	1	...
Pathology, General	Path. 421	3	2	3*	2*
Physiology	Physiol. 451	4	3	4	3
Orthodontia	Ortho. 425	1	...	...	...
Full Denture Prosthesis	Dent. 420	...	...	1	3
Removable Part. Dent. Prosth.	Dent. 421	1	3	...	...
Local Anaesthesia	Dent. 428	...	...	1	...
Operative Dentistry	Dent. 423	1	6	1	6
Pathology, Oral	Dent. 424	1	...	1	2†
Pedodontia	Dent. 425	1	...	1	...
Oral Diagnosis	Dent. 426	...	...	1	...
Oral Hygiene and Prophylaxis	Dent. 427	1	...	...	...
Dental Materials	Dent. 429	...	...	1	3

*To Feb. 15.
†Starting Feb. 15.

THIRD YEAR

Subjects	Course No.	First Term Lect.	First Term Lab.	First Term Clin.	Second Term Lect.	Second Term Lab.	Second Term Clin.
Medicine	Med. 434	1	...	...	1	...	...
General Surgery	Surg. 434	1	...	...	1	...	...
Orthodontics	Ortho. 435	1	2	...	1	2	...
Pharmacology	Pharm. 470	3	2	...	...	...	...
Full Denture Prosthesis	Dent. 430	1*	...	6	1*	...	6
Preventive Dentistry and and Dental Public Health	Dent. 431	...	...	...	1†	...	...
Fixed Part. Dent. Prosth.	Dent. 432	1	3	...	1	6	...
Operative Dentistry	Dent. 433	1	...	5	1	...	6
Endodontics	Dent. 434	...	...	...	1	2	...
Pedodontics	Dent. 435	1	2	...	1	...	3
Oral Diagnosis	Dent. 436	1	...	...	...	...	...
Periodontia	Dent. 437	1	2	...	...	...	...
Oral Surgery	Dent. 438	1	...	1*	...	...	1*
Dental Therapeutics	Dent. 439	1	...	...	...	...	...

*Lecture-Demonstration.

†Seminar.

FOURTH YEAR

Subjects	Course No.	First Term Lect.	First Term Lab.	First Term Clin.	Second Term Lect.	Second Term Lab.	Second Term Clin.
General Anaesthesia	Dent. Thera. 443	...	...	...	1	...	1*
Orthodontics	Ortho. 445	1†	...	3	1†	...	3
Full Denture Prosthesis / Removable Part. Dent. Prosth.	Dent. 440 / Dent. 441	1†	...	6	1†	...	6
Fixed Part. Dent. Prosth.	Dent. 442	...	...	7	1†	...	7
Operative Dentistry	Dent. 443	1†	...	10	1†	...	10
Endodontics	Dent. 444	...	...	1	...	...	1
Pedodontics	Dent. 445	1†	...	3	...	...	3
Oral Diagnosis	Dent. 446	1	...	1*	1	...	1*
Periodontia	Dent. 447	1	...	3	1	1†	2
Oral Surgery	Dent. 448	1	...	3	...	...	2
Ethics, Jurisprudence, Business	Dent. 449	1	...	...	1	...	...

*Student rotation in groups.

†Seminar.

No advanced credit will be granted in the above professional courses.

Clinical Dentistry

Students of the two final years are required to carry to completion a specified amount of treatment on patients in the various branches of Dentistry.

Third-year students are assigned to the diagnostic clinic, Dentistry 436, for specified periods in rotation.

Final-year students are assigned to the diagnostic clinic, Dentistry 446, on full time for periods of a week in rotation. The schedule will appear on the bulletin board.

Final-year students receive instruction at the University Hospital in general anaesthesia, medicine, surgery and restorative dentistry. They act as assistants in the dental department in the hospital.

A period of five weeks following the completion of fourth year lectures and written examinations will be devoted to clinical dentistry.

(5) DETAILS OF COURSES

Regular attendance is expected of students in all courses.

NOTE: The hours of instruction for both terms of the winter session are shown at the top of each course description. The letter "c" attached to a figure signifies clinic-hours and the letter "s" seminar-hours. Otherwise, the first figure in each term indicates lecture-hours and the second laboratory-hours.

STAFF:—

Professors Emeritus—H. E. Bulyea, W. S. Hamilton

Professors—C. R. Castaldi, S. D. Fraser, H. R. MacLean (Dean of the Faculty) K. A. McMurchy

Associate Professors—S. G. Geldart, R. D. Haryett, D. G. Macgregor, C. W. B. McPhail, D. R. Stewart, R. S. Van Alctine.

Assistant Professors—B. J. Eastwood, A. D. Fee, G. H. Gibb, R. P. Mullen, H. L. Samuels

Lecturers—N. Basaraba, C. G. Duke, D. E. Florence, J. D. Hawkins, J. S. Little, R. C. McClelland, D. H. MacDougall, R. C. Sills, W. I. M. Steen, A. R. Urschel

Sessional Lecturers—R. B. Cameron, L. A. Hague, B. M. MacKenzie, F. D. Read, G. R. Robertson, R. L. Tegart, R. A. Yuodelis

Honorary Members—J. W. Clay, C. D. Husband, H. B. Ness, R. R. McIntyre, R. A. Rooney, W. A. Quigley.

ANATOMY

412. General and Special Anatomy (0-0; 3-6)

H. E. RAWLINSON AND K. A. MCMURCHY

Gross anatomy of the body in general and of the head and neck in detail; minute anatomy of the teeth, development of the mouth, jaws and face.
Textbooks: Orban, *Oral Histology and Embryology;* Aitkin, *Manual of Dissection,* Vol. II.

416. Microscopic Anatomy (Histology and Neuroanatomy) (3-6; 2-4)

W. R. SALT AND R. F. SHANER

The minute anatomy and development of the elementary tissues and organs and the structure of the human nervous system and organs of special sense.
Textbooks: Bloom or Ham, *Histology;* Ranson-Clark, *Anatomy of the Nervous System.*

421. Anatomy (Anthropology) (0-0; 1-0)

R. F. Shaner

A brief survey of ancient man, and of the anatomical evidence for man's place in nature.

Prerequisite: Anatomy 11 or 12.

BACTERIOLOGY

412. Bacteriology (3-3; 1-3)

R. D. Stuart, E. J. K. Penikett and M. E. Williams

For students of the first year in Dentistry. During the first term the course deals with general bacteriology illustrating fundamental aspects of infection and resistance. In the second term the special bacteriology of the mouth etc. is considered in relation to dental and peridental disease. Illustrative exercises in bacteriological technique will be given in laboratory periods.

Textbook: Whitby and Hynes, *Medical Bacteriology*.

BIOCHEMISTRY

411. General Course (3-3; 3-3)

Jules Tuba and L. B. Smillie

Composition, general and physical-chemical considerations of the cell; chemistry of carbohydrates, lipids, and proteins; enzymic catalysis; digestion and absorption; general considerations, composition and functions of the blood; specialized extracellular fluids; metabolism; biochemistry of specialized tissues, including the teeth; nutrition; biochemistry of endocrine glands.

Textbooks: Harrow and Mazur, *Textbook of Biochemistry;* Cantarow and Schepartz, *Biochemistry*.

CHEMISTRY

350. Organic Chemistry (3-3; 3-3)

R. K. Brown, and R. J. Crawford

Lectures: An introduction to a study of the compounds of carbon.

Laboratory: The preparation of some organic compounds.

Textbook: Boyd and Morrison, *Organic Chemistry*.

Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd edition.

Prerequisite: Chem. 230.

This course follows the Arts and Science time-table.

ORAL ANATOMY

413. Oral Anatomy (1-3; 0-0)

J. D. Hawkins and D. E. Florence

This course deals with the nomenclature, morphology and chronology of the development of the teeth, face and jaws, the internal and external anatomy of the teeth and their occlusion, with clinical application, as well as comparative oral anatomy and evolution of the human dentition.

Textbooks: Wheeler, *Dental Anatomy and Physiology;* Linek, *Tooth Carving Manual.*

414. Oral Anatomy (0-0; 1-3)

J. D. Hawkins and D. E. Florence

This course consists of the application of Oral Anatomy to operative procedures.

Textbooks: Black, *Operative Dentistry* Volume I and II—9th Edition, Blackwell.

ORAL DIAGNOSIS

426. Oral Diagnosis and Treatment Planning (0-0; 1-0)

D. G. MacGregor

A course in diagnostic procedures and their application. The review of normal oral tissues, growth, age changes and radiographic appearances.

Textbooks: McColl and Wald, *Oral Roentgenology*; Kerr, Ash, Millard, *Oral Diagnosis.*

436. Oral Diagnosis and Treatment Planning (1-0; 0-0)

D. G. MacGregor

A course in the fundamental and elementary principles of dental roentgenology.

Lectures and demonstrations.

Textbooks: Same as Dent. 426; Stafne, *Oral Roentgenographic Diagnosis.*

Reference: Ennis and Berry, *Dental Roentgenology.*

446. Oral Diagnosis and Treatment Planning (1-1c; 1-1c)

D. G. MacGregor, K. A. McMurchy and R. S. Van Alstine

Special problems in diagnosis and treatment planning of less common oral lesions and abnormalities.

Each student is required to spend not less than one week in the Diagnostic Clinic.

Textbook: Burket, *Oral Medicine, Diagnosis and Treatment.*

OPERATIVE DENTISTRY

423. (1-6; 1-6)

H. R. MacLean and Associates

This course is designed to acquaint the student with the principles and procedures necessary to successful clinical practice.

The first half year includes ideal cavity preparation in oversized plaster teeth and in extracted natural teeth. Technical procedures in the second half year include preparing cavities and placing restorations of gold foil, gold inlay and amalgam. This work is done on a maniquin, rubber dam is placed and orderly procedure is mandatory.

The student is responsible for supplying natural teeth, unspoiled by dental caries, for his use in this course.

Textbook; Black, *Operative Density,* Vols II and III, 9th Edition, Blackwell.

433. (1-5c; 1-6c)

The lecture course is a continuation of Dent. 423 meant to emphasize the application of basic principles to clinical practice. The horizon of operative technics is broadened by relating it to the dystrophies, abrasions and erosion. The lecture course is supplemented by a weekly demonstration period.

Clinically the student is introduced to operating in the infirmary. Work is done on patients in gold foil, gold inlay and amalgam.

Cleanliness, deportment and orderliness of procedure are emphasized.

Textbook: Simon, *Clinical Operative Dentistry.*

443. (1s-10c; 1s-10c)

Weekly demonstrations supplemented by student clinics, calling for the preparation of papers, slides and models, in phases of the subject not covered in the regular course, serve to broaden the field preparatory to graduation. Clinically the work is a continuation of Dent. 433, including an introduction to the use of porcelain, silicates and cements.

PEDIATRIC DENTISTRY

425. Orthodontics (1-0; 0-0)

R. D. Haryett, B. J. Eastwood and R. P. Mullen

A course of lectures concerned with the growth and development of the dento-facial complex.

Embryology of the face and jaws is also discussed.

Textbook: Moyers, *Handbook of Orthodontics.*

435. Orthodontics (1-2; 1-2)

R. D. Haryett, B. J. Eastwood and R. P. Mullen

A course of lectures designed to acquaint the dental student with the etiology, classification, diagnosis, prevention, interception and palliative treatment procedures for malocclusions.

Laboratory instruction is given in impression, model and soldering techniques and the construction of appliances designed for cases requiring simple treatment.

Textbook: Same as for Dent. 425.

445. Orthodontics (1s-3c; 1s-3c)

R. D. Haryett, B. J. Eastwood and R. P. Mullen

Discussions of dento-facial growth, etiologic and diagnostic problems and the early recognition and attention of those cases which pass through a preventive or interceptive stage.

Clinic demonstrations and treatment of selected cases of malocclusion which are of particular concern to the general practitioner.

PEDODONTICS

425. Pedodontics (1-0; 1-0)

C. R. Castaldi and Associates

Mental and physical growth and development of the pre-school child.

Textbooks: Gesell, *First Five Years of Life;* Cohen, *Pediatric Dentistry.*

435. Pedodontics (1-2; 1-3c)

C. R. Castaldi and Associates

Restorative and preventive procedures; clinical practice with pre-school and school age children.

445. Pedodontics (1s-3c; 0-3c)

C. R. Castaldi and Associates

Case analysis and treatment planning; pedodontics in a general practice, dental care for handicapped children.

ENDODONTICS

434. Endodontics (0-0; 1-2)

R. L. Tegart and D. M. Collinson

A lecture and laboratory course on the conservation of pulp-involved and pulpless teeth. Technical procedures for diagnosis and treatment are described and correlated with the para-clinical sciences. Laboratory practice is carried out on mannekins under simulated clinical conditions.

444. Endodontics (0-1c; 0-1c)

R. L. Tegart and D. M. Collinson

A continuation of Dentistry 434 with application to clinical practice. Endodontic treatment is carried out on selected patients.

DENTAL PROSTHESIS

410. Full Denture Prosthesis (1-3; 1-3)

A. D. Fee and R. C. McClelland

A course of lectures, demonstrations, and laboratory instruction in the construction of artificial full dentures. The lectures include a study of the temperomandibular joint and the action of the muscles of mastication in relation to the arrangement of the teeth.

Demonstrations are given in the manipulation of various materials and procedures used in the mouth.

In the laboratory students have an opportunity to use the various materials, and to study the procedures which are later applied to dental practice.

Textbook: Swenson, *Complete Dentures,* 4th ed.

420. Full Denture Prosthesis (0-0; 1-3)

S. D. Fraser, A. D. Fee and R. C. McClelland

A continuation of Dentistry 410.

430. Full Denture Prosthesis (1-6c; 1-6c)

S. D. Fraser and Associates

A continuation of Dentistry 420 with an introduction to clinical practice.

440. Full Denture Prosthesis (0-3c; 1s-3c)

S. D. Fraser and Associates

A continuation of Dentristry 430 conforming to the advanced work of the final year, with application to clinical practice.

421. Removable Partial Denture Prosthesis (1-3; 0-0)

R. C. McClelland and C. G. Duke

Lecture and laboratory instruction in the design and construction of removable partial dentures. Detailed instruction is given as to the conditions where this type of restoration is indicated. The various materials used are studied as to their properties, manipulation and indication.

Textbook: Applegate, *Partial Dentures.*

441. Removable Partial Denture Prosthesis (1s-3c; 0-3c)

S. D. Fraser and Associates

Students in their final year have an opportunity to practise this branch of Prosthetic Dentistry in the clinic.

432. Fixed Partial Denture Prosthesis (1-3; 1-6)

D. R. Stewart, G. H. Gibb and Associates

Lectures, demonstrations and laboratory instruction on the preparation of teeth for crowns and attachments for fixed partial dentures, and the construction of various attachments and pontics as indicated. Models are used by students in the construction of various restorations. This course includes ceramics, which is the processing of porcelain as applied to Dentistry.
Textbook: Tylman, *Crown and Bridge Prosthesis.*

442. Fixed Partial Denture Prosthesis (0-7c; 1s-7c)

D. R. Stewart, G. H. Gibb and Associates

A continuation of Dentistry 432 with clinical application.

419. Dental Materials (1-3; 0-0)

C. G. Duke and J. D. Hawkins

A course of lectures on the various materials used in dental practice. The purpose of this course is to familiarize the student with the properties, care and manipulation of all accepted materials.
Textbooks: Skinner, *Science of Dental Materials;* Dorland, *Medical Dictionary.*

429. Dental Materials (0-0; 1-3)

C. G. Duke and J. D. Hawkins

A continuation of Dentistry 418 for students in second-year Dentistry.

ORAL SURGERY

417. Orientation and History of Dentistry (1-0; 0-0)

D. E. Florence

The purpose of this course is to familiarize first-year students with the course of Dentistry. Lectures of instruction will be given by various members of the faculty at the time of registration. It will include history, hygiene, ethics, and one's obligations as a professional man and citizen.

449. Dental Ethics, Jurisprudence and Business Principles (1-0; 1-0)

D. E. Florence, W. F. Bowker and D. Goodale

The course of lectures in ethics deals with the ideals of private and public life, man's attitude toward his fellows, his confreres and patients. Jurisprudence deals with the legal aspects of professional practice. The course in business is intended to guide the professional man in the conduct of his practice as to budgeting, investments, insurance, retirement funds, etc.
Textbook: Bregstein, *The Successful Practice of Dentistry.*

428. Local Anaesthesia (0-0; 1-0)

R. S. Van Alstine

Lectures and demonstrations on the administration of local anaesthetics.
Textbook: Archer, *Practical Anaesthesia.*

438. Oral Surgery (1-1c; 0-1c)

R. S. Van Alstine

A course of lectures on the cause and treatment of the various conditions of the mouth requiring surgical care, including removal of teeth.
Textbook: Archer, *Oral Surgery.*

448. Oral Surgery (1-3c; 0-2c)

R. S. Van Alstine and Associates

Demonstration of local anaesthesia and oral surgery and performance of operations in clinic and University Hospital.

PERIODONTIA

427. Oral Hygiene and Prophylaxis (1-0; 0-0)

R. B. Cameron

A course of instruction in elementary principles and oral hygiene and prophylaxis with introduction to clinic procedure.

Textbooks: Bunting, *Oral Hygiene and Preventive Dentistry;* Muhler, *Preventive Dentistry.*

437. Periodontia (1-2; 0-0)

H. L. Samuels and R. B. Cameron

A course which introduces the student to certain of the more important aspects of periodontia, including theories of causation of periodontal diseases, nutrition in dentistry and certain selected oral pathological microscopic sections. This course includes 10 lectures on dietetics. Later the student is afforded an introduction to practical periodontia, in preparation for the full clinic course.

Textbook: Glickman, *Clinical Periodontology.*

447. Periodontia (1-3c; 1-3c)

H. L. Samuels and R. B. Cameron

Lectures and clinical instruction in the prevention and treatment of diseases of the supporting tissues of the teeth. The various causative factors are explained with a view to impressing the student with the importance of preventing these conditions.

One hour first term; demonstrations on patients.

One hour second term; seminar.

Textbooks: Same as Periodontia 431.

439. Dental Therapeutics (0-0; 1-0)

R. B. Cameron

A course of lectures on the various remedies used in treatment of diseases of the mouth.

Textbooks: Prinz, Rickert and Dobbs, *Pharmacology and Dental Therapeutics;* American Dental Association, *Accepted Dental Remedies.*

DENTAL PUBLIC HEALTH

411. Dentistry in Public Health (0-0; 1-0)

C. W. B. McPhail and Associates

Introduction to the principles of Dentistry as applied to Public Health.

431. Dentistry in Public Health and Preventive Dentistry (0-0; 1s-0)

R. B. Cameron and S. G. Geldart

Lectures relating private practice to Public Health and an orientation of Dental Public Health at the Federal, Provincial, and Local level. Community health as it concerns dentists and dentistry.

Reference: Pelton and Wisan, *Dentistry in Public Health.*

A seminar course on the various aspects of the causes and prevention of diseases of the oral cavity. Dental caries mechanism.

PHYSIOLOGY

451. Physiology (Second Year) (4-3; 4-3)

J. W. Pearce, C. Heath, R. D. Haryett and Staff

The course consists of two parts. The first, largely given in the first term, comprises a study of basic physiology of cells and tissues, of the circulatory, digestive and respiratory systems, and of the phenomena of digestion, absorption, metabolism and excretion. The second part comprises the physiology of nerves and synapses, muscle, spinal reflexes, brain centres and tracts and the autonomic nervous system.

A series of special lectures is included, dealing with dental aspects of neuromuscular physiology. The course content is presented in lectures, demonstrations, laboratory exercises and seminars.

The lecture course is largely given simultaneously with that of Physiology 411 for medical sudents; the laboratory classes are given separately.

Textbooks: Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed.; Houssay, *Human Physiology,* 2nd ed.; Guyton, *Textbook of Medical Physiology;* Winton and Bayliss, *Human Physiology,* 3rd ed. Reference Texts: O'Rourke, *Oral Physiology;* Anderson, *Physiology for Dental Students;* Fulton, *Textbook of Physiology,* 17th ed.

PHARMACOLOGY

470. Pharmacology (third year) (3-2; 0-0)

C. W. Nash, C. N. Gillis and Staff

A course on the pharmacological actions of drugs selected for their physiological and clinical significance. The course involves a study of basic pharmacological principles as applied to representative drugs having their primary actions on various organ systems of the body. Classes of drugs studied include general and local anaesthetics; hypnotics, sedatives and anticonvulsants; analgesics; central nervous system stimulants; autonomic and curariform drugs; histamine and antihistaminics; chemotherapeutic agents. Instruction is given in the form of lectures, demonstrations and laboratory exercises. A series of wrtten reports, based on laboratory work, is required of each student.

Textbooks: Goodman and Gilman, *The Pharmacological Basis of Therapeutics,* 2nd Edition; Drill, *Pharmacology in Medicine,* 2nd Edition; Grollman, *Pharmacology and Therapeutics;* Beckman, *Drugs, Their Nature, Action and Use;* Dobbs, *Pharmacology and Oral Therapeutics; Accepted Dental Remedies.*

PATHOLOGY

421. General Pathology (3-2; 3-2)

J. W. Macgregor

A series of lectures in general pathology extending over a period of twenty-two weeks. Laboratory instruction in pathologic histology.

Textbooks: Boyd, *Textbook of Pathology,* 6th Ed.; Bell, *Textbook of Pathology,* 7th Ed.

424. Oral Pathology (1-0; 1-2)

K. A. McMURCHY

A lecture and laboratory course dealing with the pathological study of teeth, their surrounding structures, the mucous membrane, bone and other tissues. Textbooks: Bernier, *The Management of Oral Disease;* Kronfeld, *Histopathology of Teeth.*

MEDICINE

434. Medicine (1-0; 1-0)

J. DVORKIN

The course consists of one lecture each week throughout the session. The general aspects of medicine are dealt with, with particular reference to local and systemic diseases of dental interest.

For students in third-year dentistry.

Textbook: Comroe, Collins and Crane, *Internal Medicine in Dental Practice.*

443. Dental Therapeutics (0-0; 1-1c)

C. M. FLETCHER

This is a course for dental students, with particular reference to general anaesthesia. It will comprise, besides lectures and instruction on the general technique of giving the various anaesthetics, a course designed to give the student a working knowledge of the preliminary and after-care of patients and of conditions unfavorable for general anaesthesia.

SURGERY

434. Surgery (1-0; 1-0)

W. C. MACKENZIE AND ASSOCIATES

For students in the third year in Dentistry. A course of lectures covering the general principles of surgery.

XI

The Faculty of Education

INTRODUCTION

The Faculty of Education is organized for the professional training of teachers for elementary, junior high and senior high school grades, and for graduate study and research in the field of Education. All programs, except for the first three years of the Bachelor of Education in Industrial Arts program, are offered in Edmonton. The first two years of non-specialized programs, together with the first three years in Industrial Arts, are offered in Calgary.

In this calendar appear the courses of study administered by the Faculty of Education together with regulations governing these programs. Many general regulations applicable to all faculties of the University have been omitted from this calendar. These are to be found in the General Section of the University calendar which may be obtained from the Registrar's office on request.

The calendar also contains requirements for certificates issued by the Provincial Department of Education on the recommendation of the Faculty of Education. Such certificates are granted under the authority of the Minister of Education.

Address inquiries to: Dean, Faculty of Education, University of Alberta.

(1) Board of Teacher Education and Certification

A Board of Teacher Education and Certification representing jointly the Department of Education, the University of Alberta, the Alberta Teachers' Association and the Alberta School Trustees' Association serves as a liaison body for the groups it represents. This board is purely an advisory body. It is authorized to make recommendations to the Minister of Education and to the President of the University respecting the programs of instruction, the estimates of expenditures on these programs, appointments to the staff of the Faculty of Education, and regulations governing the certification of teachers.

(2) Programs (General Statement)

Entrance or matriculation requirements are specified at page 237.

The training programs are detailed at page 244. There are two general programs, one for elementary school teaching and one for secondary school teaching. The latter provides for considerable specialization either in the usual academic subjects, such as English, French and mathematics, or in the special subjects, such as household economics, industrial arts, physical education, fine arts, and commercial subjects.

In addition there is a highly specialized program in industrial arts.

All programs provide for certification by the Alberta Department of Education on the completion of two years of training, higher certification at the end of the third year, and the Bachelor of Education degree at the end of the fourth year.

In addition to its degree programs, the Faculty of Education offers a special one-year program qualifying candidates for a Junior E certificate. For details consult subsequent pages.

To suitable candidates the faculty offers graduate courses leading to the M.Ed., Ed.D. and Ph.D. degrees.

(3) Programs at Edmonton and Calgary

All programs offered by the Faculty of Education, except for the first three years' work prescribed for the B.Ed. in Industrial Arts, are available in Edmonton.

The following programs are available in Calgary:

(a) **The Junior E program.**
(b) The first two years of the B.Ed. program for elementary school teachers.
(c) The first three years of the B.Ed. program for secondary school teachers.
(d) **The first three years of the B.Ed. in Industrial Arts program.**

Students in Calgary wishing to specialize in fine arts, physical education, and in some of the sciences not taught in Calgary may find it necessary to rearrange their study programs slightly to provide for later entry into these special fields.

ADMISSION

(1) Matriculation Requirements

Matriculants from the high schools of Alberta seeking admission to the Faculty of Education in September, 1960, must possess:

(a) a High School Graduation Diploma with
(b) "B" or higher standing in the required courses of Grade XII as set forth below, and
(c) an average in these courses of at least 60%:
    1. English 30,
    2. Social Studies 30,
    3, 4, 5, 6. *Four* of: French 30, German 30, Latin 30, Chemistry 30, Physics 30, Biology 32, Mathematics 30, Music 30.

NOTES:

1. Candidates intending to specialize in household economics should offer Chemistry 30.
2. Adult applicants (age 20 or over) will not be required to present a high school diploma.
3. Candidates intending to major in mathematics should present Mathematics 31 in addition to Mathematics 30
4. **These general regulations notwithstanding, the University may, at its discretion, refuse admission to any applicant.**

(2) Junior E

For admission to the Junior E program (one year): a high school diploma and standing (B or higher) in English 30, Social Studies 30, and *three* additional Grade XII examination subjects, with an average of 60% on the five subjects.

NOTES:

1. Adult applicants (age 20 or over) may be excused the high school diploma but must present five (5) Grade XII examination subjects, including English

and Social Studies, with "B" or higher standing in each and an average on the five of not less than 60%.

2. Students completing the Junior E program successfully receive the Interim Junior E certificate issued by the Alberta Department of Education. Before this certificate may be made permanent, the holder must provide evidence to the Department of Education through the Faculty of Education that he possesses matriculation standing that will admit him to a Bachelor of Education program, must teach successfully in Alberta schools for two years, and must be recommended by a Superintendent or Inspector of Schools.
3. A student who holds the Interim Junior E Certificate may not proceed on a Bachelor of Education program until he has provided evidence that he possesses matriculation standing that will admit him to a Bachelor of Education program.
4. **These general regulations notwithstanding, the University may, at its discretion, refuse admission to any applicant.**

(3) Admission with Advanced Standing or Advanced Credits

Applicants presenting transcripts from normal schools, teachers' colleges, or universities other than the University of Alberta, will have such transcripts evaluated by the *Committee on Admissions*. The transcripts should be submitted to the Dean of the Faculty of Education, University of Alberta, Edmonton. A visé fee of *five* dollars is charged for evaluating documents issued in Canada and *ten* dollars for evaluating documents issued in other countries.

(4) Extramural Credits

Credit to a maximum of four *junior* courses taken extramurally from another recognized university will be allowed, although the actual number will vary with the program.

(5) Application for Admission

Application forms may be obtained from the office of the Dean of the Faculty of Education or from the Registrar of the University. Each student applying for the first time for admission to the Faculty of Education should write the Examinations Branch, Department of Education, Edmonton, requesting that two transcripts of his high school credits be forwarded to the Dean, Faculty of Education. When writing for transcripts he should give his name in full, the year in which his last departmental examinations were written and the grade level of these examinations. He should enclose the fee of $1.50 charged for this service.

Students from outside the province will write to the Registrar of the Provincial Department of Education in the province where senior matriculation was obtained.

Credits obtained in the June examinations of 1960 should be submitted as soon as results are available.

No definite and final ruling concerning registration can be obtained until all certificates and transcripts of standing have been reviewed by the Committee on Admissions. The Faculty of Education gladly consults with and advises students regarding programs of study, but all decisions are *unofficial* and *tentative* until documents have been received and evaluated by the Committee on Admissions.

REGISTRATION

(1) Registration and Pre-Registration Procedures

Applicants for admission must—

(a) furnish evidence by means of transcripts of credit from a Department of Education or from accredited universities that they meet matriculation requirements;

(b) complete, in duplicate, *Application for Admission* forms obtainable from the Faculty of Education or from the Registrar;

(c) indicate whether they expect to attend in Edmonton or Calgary.

(2) Registration Details

(a) Change of Registration:

The accuracy of his registration forms is the responsibility of each student. Changes in registration may be allowed on application to the Faculty of Education office within one month of date of registration. Thereafter written application for change must be made to the Dean of the Faculty and will be allowed only for the most impressive reasons.

(b) Transfer from One Program to Another:

In general, a student may transfer from one training program to another at any point in the four-year program, provided he obtains credit in subjects of the new program which were not included in the former one.

(c) Registration in Physical Education:

General University regulations require all first-year students to obtain credit in physical education. Students in the Faculty of Education will register in Physical Education 200, 201 or 203. Though students excused by a medical officer need not participate in physical exercise, they are held responsible for all theoretical and instructional phases of the courses.

(d) Who May Register?

No person other than a British subject or a Canadian citizen is eligible to receive a permanent Alberta teacher's certificate. Recent amendments to The School Act authorize temporary Alberta certification for certain candidates who, otherwise qualified as teachers, file acceptable evidence that they intend to qualify for Canadian citizenship.

"Statement re Age and Citizenship" forms must be completed by each applicant for an Alberta teacher's certificate.

(e) Limitation on Registration:

Except by special permission of the Council of the Faculty, no student under its jurisdiction may offer for credit in any period of twelve months from July 1st to June 30 more than the number of courses included in a year of the regular program. Except by special permission of the Council of the Faculty, no student may take in the Summer Session more than two courses.

GENERAL INFORMATION

(1) Education Undergraduate Society

The Education Undergraduate Society (E.U.S.) is a professional organization and a branch of the Alberta Teachers' Association (A.T.A.). It is expected that all Education students will:

(a) join the Society,
(b) participate in its social activities, and
(c) actively promote its professional interests.

(2) Transfer from One Program to Another

In general, a student may transfer from one training program to another at any point in the four-year program, provided he obtains credit in subjects of the program which were not included in the former one.

(3) Examinations

Finals

Final examinations are held at the end of each winter, summer or special session. The pass mark in all subjects of both degree and certification programs is 50%.

Supplementals

(a) In the case of a student proceeding to the B.Ed. degree by summer session study alone, special permission may be granted for the writing of supplemental examinations even though an applicant has not completed all courses prescribed in his degree program.

(b) There is no supplemental privilege in student teaching.

(c) Teachers who, during the regular Supplemental Examination period, are in teaching positions may, with approval, write the supplemental examination at the end of the Summer Session. If an examination in the required subject is on the regular schedule, the fee for the supplemental is $10.00. If a special examination paper must be prepared, the fee is $15.00.

(d) Students registered in the Junior E program who fail one or more final examinations will write supplementals in August.

(4) Extramural Study

For conditions under which undergraduates may receive credit for extramural study, see Section VIII (4).

The privilege of completing certain courses extramurally is sometimes extended to M.Ed. candidates and also to B.Ed. candidates who hold a B.A., B.Sc., or B.Com. degree. No courses in Education will be offered extramurally in 1960-61.

Some departments in the Faculty of Arts and Science may consent to extramural registration in certain courses.

(5) Regulations Governing Certification

For detailed regulations governing certification of teachers, students should write the Registrar, Department of Education, Administration Building, Edmonton. A pamphlet is available on request.

(6) Advance Credits for Certificated Teachers

One year's credit in the four-year program is given for one year of basic teacher education.

A maximum of three course credits will be allowed in the four-year general B.Ed. program for courses completed in Department of Education summer school sessions, 1935-43 inclusive, one course credit being allowed for every 75 hours of certified attendance. For teachers discharged from the armed forces a date earlier than 1935 will be taken to make full allowance for the applicant's period of service.

Few advance credits can be given certificated teachers in the B.Ed. in Industrial Arts program. One or two credits may be allowed for normal school or other basic training. Little credit can be given for courses completed in the 1935-43 summer sessions unless the courses are in the specialized field of the B.Ed. program for which they are being evaluated.

(7) Special Second-Year Program for Certificated Teachers

Certificated teachers will for their second year be entered upon a special program consisting almost exclusively of Arts and Science courses. For details, see Section XIV.

(8) Evening Credit Program

Students contemplating registration in Evening Credit courses must contact Dr. J. W. Gilles, The Director, well in advance of September 10, the last day for registration in the Evening Credit Program.

CERTIFICATION*

Alberta teaching certificates are issued only by the Department of Education, Government of Alberta. All inquiries concerning certification should be addressed to the Registrar, Department of Education, Edmonton.

The certificates mentioned in the following pages are authorized under Order-in-Council 728 (1954) of the Government of Alberta.

PART A (General Certificates)

Types of Certificates

1. Except as otherwise provided herein, the certificates issued hereafter by the Minister of Education shall be of the following classes:

Junior E Certificate,
Standard E Certificate,
Standard S Certificate,
Professional Certificate.

Grade Ranges of Certificates

2. The range of school grades throughout which each of the teachers' certificates mentioned above is valid license to teach is shown in the following schedule:

*Junior and Senior Diplomas are no longer issued.

Certificates	*Grades*
Junior E	I-IX
Standard E	I-IX
Standard S	IV-XI
Professional	I-XII

The Junior E Certificate

3. (a) A person who has completed satisfactorily an approved first-year program of the University of Alberta prescribed for teachers of the elementary and junior high school grades may be granted an Interim Junior E Certificate valid for three years.

(b) Before the Interim Junior E Certificate may be made permanent, the holder:

(i) must provide evidence to the Department of Education through the Faculty of Education that he possesses matriculation standing that will admit him to a Bachelor of Education program,

(ii) must teach successfully in Alberta schools for two years, and

(iii) must be recommended by a Superintendent or Inspector of Schools.

The Standard E Certificate

4. (a) A person who has completed satisfactorily the first two years of the B.Ed. program of the University of Alberta prescribed for teachers of elementary and junior high school grades may be granted an Interim Standard E Certificate, valid for three years.

(b) Before the Interim Standard E Certificate may be made permanent, the holder:

(i) must teach successfully in Alberta schools for two years, and

(ii) must be recommended by a Superintendent or Inspector of Schools.

The Standard S Certificate

5. (a) A person who has completed satisfactorily the first two years of the B.Ed. program of the University of Alberta prescribed for teachers of the high school grades may be granted an Interim Standard S Certificate, valid for three years.

(b) The interim Standard S Certificate may be made permanent as in 4(b) above.

(c) Graduates from the Junior E program, or from a regular Normal School one-year program, will enter a six-course program for the second year of the elementary route, or a seven-course program for the second year of the secondary route. (see page 60.)

The Professional Certificate

6. (a) A person who has completed satisfactorily three years of the B.Ed. program of the University of Alberta prescribed for teachers of the elementary and junior high school grades or of the high school grades may be granted an Interim Professional Certificate.

(b) The Interim Professional Certificate may be made permanent as in 4(b) above.

The Certification of University Graduates

7. (a) The holder of a bachelor's degree acceptable to the Minister may be granted an Interim Standard E or an Interim Standard S Certificate upon completion of one year's approved work in the Faculty of Education and may be granted an Interim Professional Certificate upon completion of two further approved courses, being one summer session's work or its equivalent, and the holder of an acceptable honors degree or a master's degree may be granted an Interim Professional Certificate upon completion of one year's approved work at the Faculty of Education.
   (b) Such Interim Certificates may be made permanent as in 4(b) above.

Teachers with Permanent Certification

8. The requirements for a permanent certificate may be waived in the case of a teacher qualifying for any certificate, provided he previously held an Alberta permanent certificate of another class.

PART B (Existing Certificates)

Exchange of Certificates

9. The holder of a certificate or license issued under former regulations may, upon application to the Minister, exchange it for a new certificate as indicated in the following table:

Table of Certificate Ratings

Certificates named in O.C. No. 70-50 or in former Regulations	*Equivalent Certificates*
Temporary License	Interim Junior E
Junior Elementary and Intermediate School Certificate	Interim Junior E
Second-Class Certificate (see section 10 below)	Junior E
Elementary and Intermediate School Certificate	Junior E (with teaching privileges extended to include Gr. X)
Senior Elementary and Intermediate School Certificate	Standard E
Junior Certificate for the High School	Standard S
First-Class Certificate	Standard E and Standard S (with teaching privileges extended to include Gr. XII)
High School Certificate	Professional
Academic Certificate	Professional
First-Class Certificate with Bachelor's degree	Professional

Second-Class Certificate

10. The holder of a permanent Second-Class Certificate may be granted a Junior E Certificate upon the completion of B.Ed. matriculation or one approved summer session of work taken either before or after the coming into effect of these regulations and if recommended by a Superintendent or Inspector of Schools. The holder of a Second-Class Certificate, either interim or permanent, shall be entitled to teach grades one to nine inclusive.

General

11. The Minister may, with respect to existing certificates, take such further action as he may deem necessary, provided such action is not inconsistent with these regulations.

PART C (Special Certificates)

This part shall apply to all teachers irrespective of date of commencement of professional training.

Types of Special Certificates

12. The Minister may grant a Special Certificate in one or more of the following subjects of the junior high school or high school program to a teacher who holds a general certificate: Art, Dramatics, Music, Business Education, Industrial Arts, Unit Shop, Home Economics, Physical Education, Guidance, and Administration. The courses for a special certificate shall be prescribed by the Minister and may be taken as part of the regular training for a general certificate or at a summer school in Alberta, or elsewhere, by permission of the Minister.

Grades of Special Certificates

13. Special Certificates may be of three grades: Junior, Senior, and Advanced.

Kindergarten-Primary Certificates

14. The Minister may grant a Kindergarten or Primary or a Kindergarten-Primary Certificate and prescribe the training required for such certificate.

Additional Information on Special Certification

15. With respect to any of the subjects mentioned in 12, above, the Minister may require that a teacher offering instruction in such subject or subjects, in addition to holding a general certificate acceptable for teaching the subject in question, shall also hold a special certificate of a prescribed grade; provided that the holder of a general certificate in grades one to nine, together with suitable special certification, may be authorized by the Minister to offer instruction in the field of his specialty in grades ten and eleven, such authorization to be valid for a year at a time only.

PART D

For further details regarding certification, requests should be directed to the Registrar, Department of Education, Administration Building, Edmonton.

DETAILS OF PROGRAMS

In this section the course requirements of the following programs are described:

A. Junior Elementary.
B. Standard Elementary B.Ed. Route.
C. Standard Secondary B.Ed. Route.
D. Special Second-Year—Certificated Teachers.
E. B.Ed. in Industrial Arts.
F. B.Ed. for holders of approved degrees.
G. Advanced study in Education.

Special Certificates:

H. Administration.
I. Guidance.
J. Business Education.

A. Junior Elementary (E)

This special one-year course qualifies candidates for the Junior E Certificate described in Section XI. For admission requirements see Section VIII. Courses with even numbers are full courses; those with odd numbers are half courses.

P.E. 203 (101): Physical Education.
P.E. 295 (105): Health.
Ed. 206 (106): Enterprise, Social Studies, and Community Problems.
Ed. 222 (121): Reading and Language.
Ed. 227 (127): Mathematics.
Ed. 229 (129): Science.
Ed. 238 (138): English.
Ed. 251 (151): Art.
Ed. 253 (153): Music.
Ed. 261 (161): Educational Administration (Grades I to IX), including school law and professional ethics.
Ed. 276 (176): Introduction to Educational Psychology.
Ed. 282 (182): Observation and Student Teaching.

NOTE 1: In this program, student teaching may be done in both city and rural schools. In Edmonton, expenses for rural teaching are pooled to equalize costs, and students should budget for an expenditure of approximately $35.00. In Calgary, with a shorter period of rural teaching, the cost is about $20.00.

NOTE: 2: Through the instructor in Ed. 251, the students will pay a lab fee of $3.00 to cover the cost of instructional supplies.

B. Standard Elementary B.Ed. Route

This program is open only to students who have clear matriculation into the Faculty of Education.

Upon completion of the first two years, candidates are eligible for the Interim Standard E Certificate, valid in Grades I to IX; completion of three years earns the Interim Professional Certificate, valid in Grades I to XII; completion of four years, the B.Ed. degreee.

First Year

1. Ed. 200: Introduction to Education.
2. P.E. 200: Physical Education.
3. P.E. 295: Health.
4. English 200 or 230.
5. History 210 or 200.
6. Ed. 276: Introduction to Educational Psychology.
7. Science (*One* of Botany 205, Zoology 222, Geography 201.)*

*With the approval of the Dean and the Associate Dean, Students in the Faculty of Education in Calgary may substitute another science option.

Second Year

1. Ed. 261: Educational Administration.
2. Ed. 382: Student Teaching.
3. Ed. 284: Social Studies.
4. Ed. 286: Mathematics-Science.
5. Ed. 288: Reading and Language.
6. Ed. 252 or 254.
7. English 398, or Art or Music option. (Art 230, Music 200, Ed. 252, Ed. 254).

Third Year

1. Ed. 476: Educational Psychology.
2. Philosophy 240, 260, 352, or 354. (Philosophy 246 or 356 may be offered by Roman Catholic students.)
3. Senior Education option.
4. English 398, or Art or Music option. (Art 230, Music 200, Ed. 252, Ed. 254).
5. Junior or Senior Arts and Science option.

Fourth Year

1. Ed. 492: Philosophy of Education.
2. Senior Arts and Science or Senior Education option.**
3. Senior Arts and Science option.
4. Senior Arts and Science option.
5. Senior Arts and Science option.

General Notes

1. **Graduation Requirements:**
   (a) **Two course credits in English, one to be English 398; two course credits in science and/or mathematics; two course credits in the social sciences, one to be in Canadian History; and one course credit in each of art and music.**
   (b) **Of the courses taken for the B.Ed. degree, students must obtain second class standing or better in no fewer than *six*, of which *four* must be senior courses.**
2. **Special Certificates:**
   Students are asked to note the possibility of securing one or more special certificates as outlined at page 283. Having met the requirements, students should apply to the Registrar, Department of Education, for the issuance of the certificate.
3. **Philosophy and psychology courses are not accepted as options.**
4. **Each candidate is advised to present a four- or five-course major for graduation.**
5. **Senior Arts and Science courses are numbered 300 or higher.**
6. **Physical Science 341 is not acceptable in a program including a course in chemistry, physics, astronomy, or geology.**

**A Senior Education option may be chosen in the fourth year only when it is part of one of the recognized majors described below.

7. **Home economics courses are not acceptable in this program.**
8. **Through the instructor in Ed. 252, the student will pay a lab fee of $3.00 to cover the cost of instructional supplies.**

Specialization

Elementary Route Majors

In consultation with staff advisers students may arrange for an elementary route major in one of the following areas:

1. English: English 200 or 230, English 398, one of Ed. 322A, 322B or 338, and two other English courses.
2. Social Science: Geography 201, History 200 or 210, Ed. 306, and two other courses.
3. Science: Geography 201, Ed. 330, and three other courses.
4. Art: Ed. 252 and three other courses.
5. Music: Ed. 254 and three other courses.
6. Primary Education, as prescribed for Primary Certificate, page 284.
7. Intermediate Grade Education: Methods in the second year and two from Ed. 306, 322B, 328, 330, 338 as offered.
8. Opportunity Room Education: Ed. 276, 476 and two from Ed. 310, 324, 370Su, 372, 470Su as offered.

C. Standard Secondary B.Ed. Route

This program is open only to students who have clear matriculation into the Faculty of Education.

Upon completion of the first two years, candidates are eligible for the Interim Standard S Certificate, valid in Grades IV to XI; completion of three years earns the Interim Professional Certificate, valid in Grades I to XII; completion of four years, the B.Ed. degree.

MAJOR AND MINOR FIELDS

Candidates must select (a) a major field of study, and (b) a minor field. Minimum requirements for the B.Ed. degree include *either* five courses on the major and two on the minor, *or* four courses on the major and three on the minor. These courses must be chosen according to the patterns listed below. Junior courses must be so selected as to permit entry to the senior courses required in the last two years.

N.B.—If the major is chosen from groups I to IX the minor may be chosen from any other group. If, however, the major is chosen from groups X to XIV, the minor must be chosen from groups I to IX.

Groups for Majors and Minors

Group	*Major*	*Minor*
I. English	1. English 200 or 230	1. English 200 or 230
	2. English 388	2. } any *two* senior English
	3. } Any *three* senior	3. } courses
	4. } English courses*	
	5. }	

*A course in North American literature is recommended.

Group	*Major*	*Minor*
II. French	1. French 200 2. French 350 or 330 3. French 330 or 350 4. Senior French course 5. Senior French course	1. French 200 2. French 350 3. French 330
III. German	1. German 200 2. German 350 3. German 400 or 450 4. Senior German course 5. Senior German Course	1. German 200 2. German 350 3. German 400 or 450
IV. Latin	1. Latin 200 2. } Two of: Latin 300, 3. } 353, 354, or 355 4. Senior Latin course 5. One of: an additional senior Latin course, or Classics 350 or 351 or Roman History 353	1. Latin 200 2. } Any *two* senior Latin 3. } courses
V. Other Foreign Languages	*Five* approved courses	*Three* approved courses
VI. Social Sciences*	1. History 200 or 210 2. Geography 300 3. } One of the following 4. } sequences: (a) Political Science 200 and 330 (b) Economics 200 and 390 (c) Sociology 320 and one other senior course in sociology (d) Any *two* approved senior history courses** 5. An approved senior history course**	1. History 200 or 210 2. Geography 300 or Political Science 200 or Economics 200 3. An approved senior history course**

*Geography 201 is recommended as a science option.

**History 200 must be followed by a senior course in Canadian or American history or Political Science 320 or Economics 310; History 210 must be followed by a senior course in European History.

Group	*Major*	*Minor*
VII. Mathematics	1. Mathematics 200 or 201 2. Mathematics 270 3. Statistics 255 4. Senior Mathematics course 5. Senior Mathematics course	1. Mathematics 200 or 201 2. ⎫ Two of: Mathematics 270, 3. ⎭ 304, Statistics 255
VIII. Biological Sciences	1. Botany 201 or 205 2. Zoology 220 3. One of: Entomology 301, Genetics 451 or 452, Zoology 300 or 350 4. One of : Botany 300, 330, Genetics 451 or 452, Horticulture 341 5. One of: Items 3 or 4 (above) or Zoology 406, 410, 460	1. Botany 201 or 205 2. Zoology 220 3. Any *one* of major items 3 or 4
IX. Physical Sciences*	1. Physics 200 or 240 2. Chemistry 230 3. Geography 201 or Geology 201 or any senior course from 4 and 5 below 4. Any *one* senior course from any of the following: (a) Physics 340, 360, 380, 410, Astron. 410 (b) Chemistry 350, 370, 372, 312 (c) Geology 351, 455, Astron. 253 (d. Geography 301, 401, 403 5. Any senior course from the group chosen in 4 above *Normally the minor associated with a physical science major should be Mathematics.	1. ⎫ Physics 200 and 2. ⎭ Chemistry 230 *or* 1. ⎫ Physics 200 or 240 and 2. ⎭ senior Physics course *or* 1. ⎫ Chemistry 230 and 2. ⎭ senior Chemistry course *and* 3. Any *one* of major items 3, 4 or 5

Group	*Major*	*Minor*
X. Fine Arts*		
Art	1. Art 230 2. Art 240 3. Art 300 4. Art 330 5. Art 400 or Philosophy 350	1. Art 230 2. } *Two* other Art courses 3. } (except Art 240)
Music	1. Music 200 2. Music 300 3. } Two of: Music 250, 4. } 400, 350 5. Philosophy 350	1. Music 200 2. Music 250 or 300 3. *One* other Music course
Drama	1. Drama 250 2. Drama 450 3. } *Two* of: Drama 360, 300, 4. } 400, 350 5. Philosophy 350 *Students wishing to cover two Fine Arts fields in their major may do so by completing a minimum of two courses in each field.	1. Drama 250 2. Drama 360 or 350 3. *One* other Drama course
XI. Household Economics	1. Household Economics 202 2. Household Economics 210 3. Household Economics 450* 4. Household Economics 350 5. Household Economics 460 *The science option must be Chemistry 250 or 350	1. Household Economics 202 2. Household Economics 210 3. Household Economics 350* or 450
XII. Business Education	1. Education 246 or 346 2. Education 248 or 348 3. } Three of: Education 350, 4. } Commercial Law, Business 5. } Administration 200 and 300, Accounting 200 and 300	1. Education 246 or 346 2. Education 248 or 348 3. Any *one* of major items 3, 4 or 5
XIII. Physical Education	1. Physical Education 209-243 2. Physical Education 324 3. Physical Education 212 4. Physical Education 392 5. Physical Education 442	1. Physical Education 209-243 2. Physical Education 324 3. Physical Education 212 *or* 1. Physical Education 392 2. Education 310 3. *One* other course in Physical Education

Group	*Major*	*Minor*
XIV. Industrial Arts	1. Education 241A-341A 2. Education 242B 3. Education 242C 4. Education 242D 5. One of: Education 242F, 342B, 342C, 342D; or Art 240, 400, Philosophy 350	1. Three of: Education 2. 241A-341A, 242B, 3. 242C, 242D

SECONDARY ROUTE PROGRAM

First Year

1. Ed. 201: Introduction to Education.
2. P.E. 201: Physical Education.
3. Sociology 202*
4. English 200 or 230.
5. Ed. 276: Introduction to Educational Psychology.
6. Arts and Science (major)**
7. Arts and Science (minor)

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*With the approval of the Dean and Associate Dean, students in the Faculty of Education, Calgary, may substitute another course.

**Unless the major field is English

Second Year

1. Ed. 262: Educational Administration.
2. Ed. 280S: Education Methods. (VII-XII)
3. Ed. 382: Student Teaching.
4. Arts and Science (major)
5. Arts and Science (minor)

Third Year

1. Ed. 476: Educational Psychology.
2. Phil. 240, 260, 352, or 354. (Phil. 246 or 356 may be offered by Roman Catholic students.)
3. Senior Education option.
4. Senior Arts and Science (major).
5. Jr. or Sr. Arts and Science option.*

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*This must be a Division "C" option for those whose programs have not yet included such an option. (See General Note 2, below.)

Fourth Year

1. Ed. 492: Philosophy of Education.
2. Senior Education option.
3. Sr. Arts and Science (major).
4. Sr. Arts and Science (major or minor).
5. Sr. Arts and Science option.

General Notes

1. **Philosophy and psychology courses are not accepted as options.**
2. **Students must include a Division "C" option (mathematics or science) as a requirement for the B.Ed. degree. A laboratory science is recommended.**
3. **Graduation Requirement: Of the courses taken from the B.Ed. degree, students must obtain second class standing or better in no fewer than *six*, of which at least *four* must be senior courses.**
4. **Special Certificates: Students are asked to note the possibility of securing one or more special certificates as outlined at page 283. Having met the requirements, students should apply to the Registrar, Department of Education, for the issuance of the certificate.**

D. Special Second Year for Certificated Teachers

Transfer Year: Four-Year B.Ed. Program

Certificated teachers are granted credit for the first year of the general B.Ed. program on the strength of their Normal School or Junior E training, provided that this training was of not less than seven months' duration.

If such certificated teachers have clear matriculation into the Faculty of Education, they will be admitted to the second year of the program. A special program for the second year is provided in order that all essential courses will be included.

It will be noted that candidates taking the elementary route have six courses to do; those entering the secondary route have seven. The reason for this extra load is that all one-year training was in the field of elementary education.

Students take five courses in a winter session. A summer session is required to complete the *transfer* second year.

Second Year

Elementary Route

1. Ed. 200*.
2. English 200 or 230.
3. History 200 or 210.
4. Science: one of Bot. 205, Zoo. 222, Geog. 201**.
5. English 398 or Art 230 or Music 200.
6. Arts and Science or Sr. Education option.

Secondary Route

1. Sociology 202**.
2. English 200 or 230.
3. Ed. 280S*.
4. Major.
5. Minor.
6. Major.
7. Minor.

Third and Fourth Years

As prescribed for these years in the regular programs for the B.Ed. degree—elementary or secondary route. Candidates in the elementary route are required to include English 398 (Children's Literature) in their programs.

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*Some observation and student teaching may be required of students registered in these courses.

**With the approval of the Dean and Associate Dean, students in the Faculty of Education, Calgary, may substitute another course.

Special Programs

In all special programs, students may qualify for the Interim Standard S Certificate, valid in Grades IV to XI, at the end of the second year.

E. B.Ed. in Industrial Arts

Candidates wishing to prepare for teaching in general shop should follow the program headed Basic General Program. It provides for certification on the completion of the second and third years and for the B.Ed. in Industrial Arts degree on completion of the fourth year. Candidates proposing to specialize in unit shop will find details under the heading Special Programs below.

The first three years of the Basic General Program are offered only at Calgary; the fourth year at Edmonton.

A few Industrial Arts courses will be offered each year at the Summer Session in Edmonton. These are primarily for the convenience of students in the B.Ed. Program, Secondary Route, who wish to major in Industrial Arts and so qualify for Industrial Arts certificates. Course requirements are shown at page 285.

Basic General Program

First Year

1. Ed. 201: Introduction to Education.
2. Phys. Ed. 201: Physical Education.
3. Soc. 202*.
4. Ed. 276: Introduction to Educational Psychology.
5. Ed. 241A: Mechanical Drawing.
6. Ed. 242B: Woodwork.
7. Ed. 242C: Electricity.
8. Ed. 242D: Metal Work.

*With the approval of the Dean and Associate Dean, students in the Faculty of Education, Calgary, may substitute another course.

Second Year

1. English 200 or 230.
2. Ed. 261: Educational Administration for Industrial Arts students.
3. Ed. 280S(I.A.): Education Method (Grades VII to XII).
4. Ed. 382: Observation and Student Teaching.
5. Ed. 341A: Mechanical Drawing.
6. Ed. 342B: Woodwork.
7. Ed. 242F: Auto Mechanics.

Certification: Interim Standard S Certificate and Junior Certificate in Industrial Arts.

Third Year

1. A junior or senior A, B, C option.*
2. A junior or senior A, B, C option.*
3. Ed. 441B: Woodwork.
4. Ed. 341D: Welding.

*Options in philosophy and psychology are not accepted.

5. Ed. 341E: Handicrafts.
6. Ed. 341F: Auto Mechanics.
7. Ed. 342C: Electricity.
8. Ed. 342D: Metal Work.

Certification: Interim Professional Certification and Advanced Certificate in Industrial Arts.

Fourth Year

1. Phil. 240, 260, 352, or 354 (Phil. 246 or 356 may be offered by Roman Catholic students).
2. Ed. 492: Philosophy of Education.
3. 4. 5. Three senior Division A, B, C options.*

General Notes

1. **Graduation Requirement: Of the courses taken for the B.Ed. in Industrial Arts degree, students must obtain second class standing or better in no fewer than *six*; *three* must be Junior or Senior Arts and Science or Senior Education courses.**
2. **Certificated teachers desiring to secure special certificates in Industrial Arts should refer to page 285 for course requirements.**

Special Programs for Teachers of Unit Shop Subjects

Candidates may follow one of three routes according to their status on entry. In all cases a regular matriculation standing is required.

Route 1. For those who propose to specialize in a unit shop subject in the third year and who are prepared to undertake fifteen (15) months of approved industrial experience and qualify for a certificate of apprenticeship from the Apprenticeship Board of Alberta.

Approved industrial experience is interpreted to mean that the candidate has filed an apprenticeship application with the Apprenticeship Board at the time of commencement of industrial experience. The Apprenticeship Board should be advised of changes of place of employment in order that progress may be checked by the field staff.

Qualify for Certificate of Apprenticeship is interpreted to mean that the candidate has passed a fourth year apprenticeship examination.

Route 2. For those with Alberta journeyman's status. A special three-year program is required as detailed below.

Route 3. For those who have completed an approved two-year program at the Institute of Technology and Art and who have completed a minimum of ten months' approved work in industry. The same three-year program is required as in Route 2.

Route 1. The first, second and fourth years of the basic general program will be followed. The third year becomes one of unit shop specialization. It may be entered only upon the recommendation of the Dean.

Third Year (Unit Shop Program)

1. A junior or senior Arts and Science option*.
2. A junior or senior Arts and Science option*.
3. Unit shop in Wood—
   Ed. 441B
   Shop, 4½ days per week
   or
3. Unit Shop in Auto Mechanics—
   Shop, 5 days per week
   or
3. Unit Shop in Electricity—
   Shop, 4 days per week
   Ed. 342C
   or
3. Unit shop in Metal—
   Shop, 5 days per week

Certification: Interim Professional Certificate and the Specialist Advanced Certificate in a unit shop subject when journeyman status is achieved.

The programs in unit shop will ordinarily continue for some weeks beyond the University term in the spring. For details on this point, consult or write the Associate Dean, Calgary. Regular examinations will be written in Ed. 441B and 342C where taken. Shop performance will be appropriately assessed and marks recorded.

Route 2. Candidates who have acquired Alberta journeyman's status in an area of unit shop specialization taught in Alberta high schools and who present clear matriculation to the Faculty of Education may enter upon a special three-year program leading to certification and a degree.

(a) First year: omitted.

(b) Special second year: English 200 or 230, Ed. 276, Ed. 261, Ed. 280S(I.A.), Ed. 382, and one Arts and Science option. Certificates: Interim Standard S Certificate and the Specialist Senior Certificate in a unit shop subject if recommended by the Dean of the Faculty of Education.

(c) Special third year: Three approved shop courses at least one of which must be in the field of specialization: two junior or senior Arts and Science options; and Ed. 441B and Ed. 341E or approved alternative(s). In practice, variations from the above may be arranged through student-staff consultation. Certificates: Interim Professional Certificate and the Specialist Advanced Certificate in a unit shop subject.

(d) Special fourth year: Ed. 476; Phil. 240 or alternative; Ed. 492, and two senior Arts and Science options.* Qualifies for the B.Ed. in Industrial Arts degree.

Route 3. For information about the special two-year program at the Institute of Technology and Art at Calgary, candidates should write direct to the Principal of the Institute. The subsequent University program is that detailed for Route 2.

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*Options in philosophy and psychology are not accepted.

F. B.Ed. Programs for Holders of Approved Degrees

Program For Teachers in the Secondary School

The following are basic courses from which selection will be made for the various purposes and for various categories of students according to the schedule below.

(1) Ed. 280S: Education Method.
(2) Ed. 382: Observation and Student Teaching.
(3) Ed. 462: Educational Administration.
(4) One of Ed. 308, 310, 478, or a suitable course approved by the Division of Educational Psychology.
(5) Ed. 476: Educational Psychology.
(6) One of Philosophy 240, 260, 352, or 354 (Philosophy 246 or 356 may be offered by Roman Catholic students.)
(7) Ed. 492: Philosophy of Education.
(8) An approved senior A, B, C, or senior Education option.*
(9) An approved senior A, B, C, or senior Education option.*

*With divisional approval, well qualified students may elect a graduate course in Education.

SCHEDULE OF CERTIFICATION AND GRADUATION REQUIREMENTS

Non-Certificated Candidates

Holding B.A. or Equivalent Degree:

Interim Standard S: (1) to (5) inclusive.
Interim Professional: (1) to (7) inclusive.
B.Ed. degree: (1) to (9) inclusive.
Graduation requirement: Four seconds or firsts.

Holding M.A. or Honors Degree:

Interim Professional: (1) to (5) inclusive.
B.Ed. degree: (1) to (7) inclusive.
Graduation requirement: Four seconds or firsts.

Certificated Candidates

Holding B.A. or Equivalent Degree:

Interim Standard S: (1), (5).
Interim Professional: (1), (5), (6), (7).
B.Ed. degree: (1), (5), (6), (7), (8), (9).
Graduation requirement: Three seconds or firsts.

Holding M.A. or Honors Degree:

Interim Professional: (1), (5).
B.Ed. degree: (1), (5), (6), (7).
Graduation requirement: Three seconds or firsts.

NOTE:

The holder of a first-class certificate and a B.A. or M.A. or equivalent degree is entitled to a professional certificate without further requirement.

Program For Teachers in the Elementary School

The following are basic courses from which selection will be made for various purposes and for various categories of students according to the schedule below.

(1) Education 284 Social Studies.
(2) Education 286 Mathematics - Science.
(3) Education 288 Reading and Language.
(4) Education 476 Educational Psychology.
(5) Education 382 Student Teaching.
(6) Education 462 Educational Administration.
(7) Philosophy 240, 260, 352, or 354 (Phil. 246 or 356 may be offered by Roman Catholic Students.)
(8) Education 492 Philosophy of Education.
(9) One of Education 252 (Art), Education 254 (Music), Education 310 (Mental Hygiene), Education 324 (Expressive Activities in the Primary Grades), or P.E. 200.
(10) Senior Arts or Education option.

Non-Certificated Candidates

Holding B.A. or Equivalent Degree:
Interim Standard E: (1) to (6) inclusive.
Interim Professional: (1) to (8) inclusive.
B.Ed. degree: (1) to (10) inclusive.
Graduation requirement: Four seconds or firsts.

Holding M.A. or Honors Degree:
Interim Professional: (1) to (6) inclusive.
B.Ed. degree: (1) to (8) inclusive.
Graduation requirement: Four seconds or firsts.

Certificated Candidates

Holding B.A. or Equivalent Degree:
Interim Standard E: (1), (2), (3), (4).
Interim Professional: (1), (2), (3), (4), (7), (8).
B.Ed. degree: (1), (2), (3), (4), (7), (8), (9), (10).
Graduation requirement: Three seconds or firsts.

Holding M.A. or Honors Degree:
Interim Professional :(1), (2), (3), (4).
B.Ed. degree: (1), (2), (3), (4), (7), (8).
Graduation requirement: Three seconds or firsts.

NOTE:
The holder of a first-class certificate and a B.A. or M.A. or equivalent degree is entitled to a professional certificate without further requirement.

G. Advanced Study in Education

I. *Graduate Degrees in Education*

All candidates for advanced degrees register with the Faculty of Graduate Studies which administers graduate programs throughout the University.

In the Faculty of Education graduate work is offered for the preparation of teachers, supervisors, guidance workers, administrators and other educational

specialists, and may lead to the degrees of Master of Education, Doctor of Education and Doctor of Philosophy. Candidates for these advanced degrees specialize in terms of the divisional organization of the Faculty of Education as follows:

Division of Elementary Education: curriculum and instruction in kindergarten, primary and elementary education. Chairman—Dr. W. D. McDougall.

Division of Secondary Education: curriculum and instruction in secondary education (Grades VII - XII), educational history, philosophy, and sociology. Chairman—Dr. H. S. Baker.

Division of Educational Psychology: child and adolescent psychology, educational psychology, guidance, mental hygiene, special education, clinical psychology, tests and measurements. Chairman—Dr. G. M. Dunlop.

Division of Educational Administration: school administration (elementary and secondary), general supervision, school finance and business administration, chief administrative roles. Chairman—Dr. A. W. Reeves.

In order to meet the needs and interests of candidates, the divisions permit considerable flexibility in the programs leading to advanced degrees. In general, students pattern their courses from the offerings of the division of their choice supplemented by approved courses from other divisions and departments of the University. Normally a candidate for the master's degree must present a program consisting of six courses and a minor thesis. A candidate for the doctor's degree (if he already holds a master's degree) is normally required to spend two academic years in study and research in residence at the University of Alberta.

Graduate courses in education are offered in both the regular and the summer sessions. Candidates for the master's degree may meet the residence requirement through summer sessions only. The full residence requirement for the doctor's degree may not be met in this way.

Initial Procedure: After a student has decided upon an area of specialization, he should communicate directly with the appropriate divisional chairman and, if possible, arrange for an interview. By this means the student's eligibility will be determined and further information given about the degree programs available in the Division.

Prospective candidates are referred to the Calendar of the Faculty of Graduate Studies for specific information about admission requirements, academic standards, registration dates, costs, etc. This calendar may be obtained from the office of the Registrar, or of the Division concerned.

II. *Non-Degree Programs*

A student holding a B.Ed. degree or the equivalent and not desiring to register for a graduate degree or not meeting all the requirements for admission to the Faculty of Graduate Studies, may register in the Faculty of Education as a *special* student.

H. Special Certificate in Administration

The requirements for the Special Certificate in Educational Administration are as follows:

(a) Course requirements:
Credit in Education 525, Education 559, Education 561, Education 563, plus two additional senior or graduate courses in Arts or Education as approved by the Division of Educational Administration with a mark of 65 or better required in each course or half course.

(b) *Certification requirement*:

Possession of an Alberta Permanent Professional Certificate.

I. Special Certificates in Guidance

The requirements for the Special Certificates in Guidance are as follows:

The Junior Certificate in Guidance

(a) *Course requirements*:

1. Education 476 (Educational Psychology)
2. *One* of:
   (a) Education 308 (Guidance)
   (b) Education 310 (Mental Hygiene)
3. *One* of:
   (a) the remaining course from item 2 above
   (b) Education 474 (Education Clinic)
   (c) Education 478 (Measurement and Evaluation)

(b) *Certification requirement*:

Possession of a permanent general teaching certificate.

NOTE: Education 308 is recommended for those persons intending to be counsellors in the secondary schools, and Education 310 for teachers in the elementary or secondary schools who are interested in guidance.

Senior Certificate in Guidance

(a) *Course requirements*:

1. Education 474-574 (Education Clinic)
   OR
   Education 510 (Counselling in Education)
2. Education 508 (Organization and Administration of the Guidance Program)
   OR
   Education 526 (Educational Supervision)
3. Education 478 (Measurement and Evaluation) and
   Education 576 (Introduction to Educational Research)
   OR
   Statistics 255 and
   Education 578 (Advanced Testing and Measurement)

(b) *Certification and experience requirements*:

1. Possession of a Junior Certificate in Guidance.
2. Possession of a Permanent Professional Certificate.
3. Two years' experience as a counsellor (or equivalent experience) approved by the Provincial Supervisor of Guidance.

NOTE: If Education 474 has been included for the Junior Certificate, credit in Education 510 or an approved alternative must be secured.

J. Special Certificates in Business Education

Courses Leading to Certification

Two courses in typewriting and two in shorthand, which lead to junior and senior certification in these subjects, are now available in the Faculty of Education. These courses are Education 246 and 346—Typewriting, and Education 248 and 348—Shorthand. While these courses will lead to certification in typewriting and shorthand, they cannot be presented for degree credit except by B. Ed. students in the secondary route who have formally elected a major or a minor in business education. Not more than one course in typewriting and one in shorthand may be presented for degree credit.

These courses, together with Education 350—Office Practice, Accounting 200 and 300 and Commercial Law, now make it possible for teachers to secure complete certification in commercial subjects within the University.

DETAILS OF COURSES

NOTE: The hours of instruction per week for both terms are shown at the top of each course description. The first figure in each term indicates lecture hours and the second laboratory hours. Courses which may be taught in either term are indicated by the words "half-year". Even numbered courses are full courses; odd numbered courses are half courses. Numbers in parenthesis refer to previous designation of courses.

STAFF OF THE FACULTY OF EDUCATION

DIVISION OF EDUCATIONAL ADMINISTRATION—

Professors—H. T. Coutts, A. L. Doucette (Calgary), G. L. Mowat, A. W. Reeves (Chairman), H. T. Sparby

Associate Professors—J. D. Aikenhead (Calgary), J. H. M. Andrews, H. C. Melsness, W. H. Worth

Assistant Professor—J. E. Cheal

DIVISION OF EDUCATIONAL PSYCHOLOGY—

Professors—G. M. Dunlop (Chairman), J. W. Gilles, R. S. MacArthur

Associate Professors—C. C. Anderson, J. D. Ayers, D. B. Black, C. M. Christensen, J. G. Woodsworth (Calgary)

Assistant Professors—W. B. Dockrell, R. J. C. Harper, J. Macdonald, J. G. Snider (Calgary), J. A. Stewart (Calgary)

DIVISION OF ELEMENTARY EDUCATION—

Professors—T. G. Finn (Calgary), W. E. Hodgson, W. D. McDougall (Chairman)

Associate Professors—Muriel A. Caldwell, Jean D. Dey, J. A. Forbes, C. Hampson, Dorothy M. Lampard, L. D. Nelson, Bertha M. Newton (Calgary), A. A. Smith, Helen B. Stadelbauer (Calgary)

Assistant Professors—F. E. Churchley (Calgary), Helen M. Diemert, E. M. Dodd (Calgary), Q. D. Doolittle (Calgary), Elizabeth Filipkowski, Marion D. Jenkinson, Ethel M. King (Calgary), Evelyn R. Moore, S. Norris (Calgary)

DIVISION OF SECONDARY EDUCATION—

Professors—H. S. Baker (Chairman), E. W. Buxton, B. E. Walker

Associate Professors—B. Y. Card, S. A. Earl, S. A. Lindstedt (Calgary), W. Pilkington, A. G. Storey (Calgary), K. H. Thomson

Assistant Professors—R. N. Anderson (Calgary), Mary A. Beaton (Calgary), M. Chorney (Calgary), D. H. Crawford, Geraldine Farmer, Priscilla J. Eccles (Calgary), W. E. Gandy (Calgary), Lois R. Godwin, M. R. Lupul, M. Nay

I—Undergraduate Courses

200. (100.) Introduction to Education (3-0; 3-0)

B. Y. Card, T. G. Finn and Associates

An introductory course in education stressing the historical and sociological approaches to educational problems. Some attention will be given to basic procedures and methods.

201. Introduction to Education (2-0; 2-0)

B. Y. Card, T. G. Finn and Associates

Selected topics from Education 200.

206. (106.) Social Studies (3-2; 3-2)

W. D. McDougall, T. G. Finn and Associates

How the elementary and junior high schools endeavor to satisfy the psychological and social needs of children from six to fifteen years of age; the selection, organization, development and evaluation of enterprises; the social studies in the junior high school; audio-visual aids; library and reading problems in the social studies; the school and the community; and extensive reading in selected phases of the content of the elementary and junior high school programs. There will be observation, participation and teaching in Grades I-IX.

222. (121.) Reading and Language (3-0; 3-0)

Muriel Caldwell, Bertha M. Newton and Associates

A survey of the skills and abilities to be developed in reading, literature, language, spelling, handwriting, speech training and choral speech for divisions one and two; methods of development; authorized textbooks and materials available for use.

224. Speech in the Elementary School (3-0; 3-0)

To Be Announced

The basic elements of speech and listening: application of speech and listening in discussions, choral speech, story telling, radio speaking, and interpretive reading; the consideration of special speech problems of teachers and pupils.

(Not offered in 1960-61).

227. (127.) Mathematics 3 hrs. (half year)

L. D. Nelson, S. A. Lindstedt and Associates

Introduction to the teaching of elementary mathematics with emphasis on basic methods.

229. (129.) Science (2-0; 2-0)

C. Hampson, S. Norris and Associates

Division 1 and 2.

Science and the integrated program; sources of materials; utilizing community resources; intra and extra classroom activities.

234. (34.) Music Education (2-1; 3-1)

A. A. Smith, F. E. Churchley and Associates

Open to Education students without music training adequate for admission to Music 200. Voice production, sight reading, ear training, rudiments of music, music history. Introduction to form. Instruments of the orchestra.

238. (138.) English (3-0; 3-0)

W. Pilkington, A. G. Storey and Associates

Varied activities to develop the students' oral and written language; a study of poetry, prose and drama to broaden the students' background, to give them a deeper appreciation of literature and to serve as standards for their own creative writing.

241A-341A (141A, 241A) Industrial Arts—Mechanical Drawing (First and Second Years) (1-2; 1-2)

G. R. Howarth

Use and care of drafting instruments and drafting equipment. Single-stroke lettering. Geometric drawing, including angles, polygons, tangents and ellipses, with problems. The making and use of scales. Mechanical and architectural conventions. Conventional drawing of bolts and screws. Simple blueprint reading.

Orthographic projection, including sections and auxiliary views. Cabinet and isometric drawing. Shop sketching. Projection perspective and the plan method of mechanical perspective.

Assembly and detail drawing. Surface development drawing, including shapes based on type forms and triangulation methods. Simple building drawing. Drawing of shop projects involving simple design. Tracing and blueprinting.

242B. (142B.) Industrial Arts—Woodwork (2-4; 2-4)

R. H. Cunningham

Care, adjustment and repair of hand tools. Basic tool procedures involving instruction and practice in the use of all the commonly used hand tools. Wood finishing; application of the elementary types of finishes, paints, stain and varnish, enamel, etc.

242C. Industrial Arts—Electricity (3-3; 3-3)

R. H. Cunningham

Electron theory; sources of electrical energy; electrical units; electrical circuits; Ohm's Law; Canadian Electrical Code; electro-magnetic induction, Lenz's Law; electrical instruments; direct current motors and generators.

242D. Industrial Arts—Metal Work (2-4; 2-4)

J. D. Harron

Common metals and their alloys: elementary metallurgy; sheet metal work; introduction to welding, forging, casting, heat treating; bench work.

242F. Industrial Arts—Automotive Mechanics (2-4; 2-4)

F. Wynne

The automobile and its power plant; general construction of the automobile; auxiliary systems; fuel, carburetion, lubricating, cooling; clutch and gear box; rear axles; drive shafts and universal joints; front axles and steering gears; brakes; miscellaneous.

246. Teaching of Typewriting (6L; 6L)

Geraldine Farmer

This course is designed to offer instruction in the pedagogical aspects of teaching typewriting to others, to provide an understanding of the curriculum in typewriting in the secondary school, and to develop basic competency in typewriting. Open to students not eligible for admission to Education 346.

248. Teaching of Shorthand (6L; 6L)

Geraldine Farmer

This course is designed to offer instruction in the pedagogical aspects of teaching shorthand to others, to provide an understanding of the curriculum in shorthand in the secondary school, and to develop basic competency in shorthand. Open to students not eligible for admission to Education 348.

251. (151.) Art (2-0; 2-0)

J. A. Forbes, Helen B. Stadelbauer and Associates

This is an introductory course which aims to awaken in the student an appreciation of the possibilities of art training in his present social environment, as well as its value in elementary school education. The course will offer fundamental art experiences anticipating the obvious needs of teachers. Emphasis will be placed upon drawing, composition, color and the various media suitable for school use.

252. Art (3L; 3L)

J. A. Forbes and Helen B. Stadelbauer

The development by each student of an appreciation of art; the study of art as a medium of creative expression by children; and the development by each student of some degree of skill in handling the media used in the school programs.

253. (153.) Music (2-0; 2-0)

A. A. Smith, F. E. Churchley and Associates

A study of materials and methods used in music education in the elementary and junior high schools.

254. Music (3L: 3L)

A. A. Smith, F. E. Churchley

A laboratory course designed to prepare teachers for effective music teaching in the schools; survey of songs, instrumental compositions, and recordings; effective performance and listening techniques; values and techniques of notation; rhythmic and creative activities.

255. Speech and Dramatization (3-0; 0-0)

A basic course in drama and dramatization for the schools. Classroom, stage

and workshop techniques in the theatre arts. Practical laboratory work is required of all registrants.
Prerequisite: Drama 250.
(Offered at the Banff School of Fine Arts for special certification only.)

261. Educational Administration (3-0; 0-0)

H. C. Melsness, J. D. Aikenhead and Associates

A basic course in educational administration dealing with topics of special significance to the classroom teacher. Topics in this course include: The Alberta School System, Professional Ethics, School Law.

262. Educational Administration (3-0; 3-0)

H. C. Melsness, J. D. Aikenhead and Associates

A basic course in educational administration dealing with topics of special significance to the classroom teacher. Some of the topics are: The Alberta School System, School Law, Classroom Management, Records and Reports, Extracurricular Activities.

276. (176.) Introduction to Educational Psychology (3-0; 3-0)

Staff

An introduction to childhood and adolescence, stressing physical, mental, social, emotional, and personality development; the psychology of learning and of the special learning areas; the application of psychological principles to classroom practice.

280S. Education Method (3-0; 3-0)

E. W. Buxton, S. A. Lindstedt and Associates

Subject matter organization and method for the senior high school grades. Required of all candidates (except those in the B.Ed. in Industrial Arts) qualifying for the Standard S Certificate in winter session. Each student registered in this course will elect *two* of the following fields of study: English, mathematics, science, French, commercial subjects, household economics, industrial arts, agriculture, social studies, physical education, art, drama, music. Students who have secured credit in Physical Education 104Su may not subsequently elect the physical education section of Education 280S.
Prerequisites or co-requisites: Two full courses in each of the major and minor fields of study.

Notes:

1. The prerequisite in music may be waived with permission of the instructor.
2. Students presenting languages other than French will have their cases considered individually.

280S(I.A.). Education Method for Industrial Arts Students (3-0; 3-0)

S. A. Lindstedt and D. A. Gaudette

Required of all B.Ed. in Industrial Arts candidates qualifying for the Junior Diploma (Standard S Certificate) in winter session. The first half of the course will be devoted to a study of the basic principles of teaching methods as they apply to a variety of subject areas in the high school. The second half of the course will deal with special methods and techniques specific to industrial arts.

280S-Su Education Method (3-0; 3-0)

STAFF

Subject matter organization and method in the high school grades. Required of all candidates qualifying for the Standard S Certificate in the Summer Session. The course will be presented in sections as shown in 280S above. Each student is required to elect only one of these sections.

Prerequisites or Corequisites: One year of successful teaching. Two full courses in the major or the minor teaching field.

NOTE: Registration in Education 280S-Su will not be accepted from students who will be continuing their undergraduate studies in the winter session.

282. (182.) Observation and Student Teaching

W. E. HODGSON, J. D. AIKENHEAD AND ASSOCIATES

Observation and student teaching for Junior E students.

284. Social Studies (3-0; 3-0)

EVELYN MOORE AND T. G. FINN

Selection, organization, development and evaluation of enterprises; the social studies-language program in junior high school grades; audio-visual materials; library and reading problems in the social studies. There will be observation and teaching in Grades I - IX.

286. Mathematics and Science (3-0; 3-0)

L. D. NELSON, C. H. HAMPSON, S. LINDSTEDT, S. NORRIS

Aims and objectives of mathematics and science education in the elementary school; appropriate classroom activities and the development of representative units in the specific content areas involved.

288. Reading and Language (3-1; 3-1)

MARION JENKINSON AND BERTHA NEWTON

A study of the elementary school program in the language arts including reading, literature, language, spelling, handwriting, speech training and choral speaking, with emphasis on objectives, content, methods and materials.

306. Enterprise Education (3-0; 3-0)

EVELYN R. MOORE

A course for certificated teachers. This course is designed to establish a firmer appreciation of the principles basic to the enterprise method and to assist teachers to improve their competence where deficiencies in the use of the enterprise method are most apparent.

Prerequisite: Ed. 206 or Ed. 284 or appropriate section of 280S or permission of instructor.

308. Guidance (3-0; 3-0)

C. M. CHRISTENSEN

Basic principles and techniques of guidance; case studies, interviews, records, with emphasis on scholastic and personal guidance; introduction to the tests and measures most commonly used in guidance.

Prerequisite: Education 276 or equivalent.

310. Mental Hygiene in Teaching **(3-0; 3-0)**

W. B. Dockrell

Principles of mental hygiene; the dynamics of behavior; mental health of the teacher; classroom application of mental hygiene principles.
Prerequisite: Education 276 or equivalent.

312. Audio-Visual Aids **(3-1; 3-1)**

C. Hampson

Theory of audio-visual aids; types of aids available for instructional purposes; principles and techniques of teaching with such aids; examination and preparation of audio-visual aids; experience in the operation and care of specialized equipment.

316. School Libraries **(3-0; 3-0)**

To Be Announced

A study of the school library and its functions, including simplified cataloguing, reference, circulation, and the care and repair of books; special emphasis on the planning and equipping of the library, principles of book selection, evaluations of books, book talks and story telling, building of a book collection and its coordination with the course of studies.
(Offered in summer sessions only.)
This course is especially arranged for teachers who are interested in school libraries and should be of great assistance to them in the discharge of responsibilities connected with any type of library.
(Not offered in 1960-61).

322A. Reading in the Primary Grades **(3-0; 3-0)**

Jean D. Dey

A course in reading instruction, including readiness for reading, development of fundamental reading abilities, selection of materials of instruction, and organization of the reading program.
Prerequisite: Ed. 222 or Ed. 288 or permission of instructor.

322B. Reading in the Intermediate and Junior High School Grades **(3-0; 3-0)**

Dorothy Lampard

A course in reading instruction, stressing the organization and content of the basic reading program in the senior elementary grades, special reading problems in the content subjects of the junior high school, individualized instruction at all levels, and the selection of reading materials.
Prerequisite: Ed. 222 or Ed. 288 or appropriate section of 280S or permission of instructor.

324. Creative Expression in the Primary Grades **(3-0; 3-0)**

Jean D. Dey

A course in the content and organization of the program in language, dramatization, art, music, rhythms and play for the kindergarten and primary grades.

328. Arithmetic in the Elementary and Junior High School Grades **(3-0; 3-0)**

D. H. Crawford and S. A. Lindstedt

The mathematics curriculum: content, methods, instructional materials, evaluation; diagnosis and treatment of learning difficulties; and experimental programs.

Prerequisite: Education 227 or 286 or 280S (Math.) or permission of instructor.

330. Science in the Elementary and Junior High School Grades **(3-0; 3-0)**

C. Hampson

A course in the teaching of science programs of the elementary and junior high school grades: development of appropriate laboratory equipment; selection of materials of instruction; field work.

Prerequisite: Ed. 229 or Ed. 286 or appropriate section of 280S or permission of instructor.

338. Language Arts in the Elementary and Junior High School Grades **(3-0; 3-0)**

Dorothy Lampard

A course in the teaching of language arts in Grades I-IX; objectives, evaluation and instruction in oral and written English; spelling, penmanship, outlining, summarizing and note writing; diagnostic and remedial techniques; criteria for selection and placement of content. Special attention will be given to the integration of language and social studies in the junior high school grades.

Prerequisite: Ed. 222 or Ed. 288 or appropriate section of Ed. 280S or permission of instructor.

341D. Industrial Arts—Welding **(1-2; 1-2)**

To Be Announced

The theory and practice of oxy-acetylene and arc welding.

341E. Industrial Arts—Handicrafts **3 hrs. (half year)**

Marion F. Nicoll

Procedures, materials and project development in media particularly suitable for the junior high school industrial arts program: leather, plastics, art metal, woodcraft novelties, wood carving.

341F. Industrial Arts—Automotive Mechanics **(1-2; 1-2)**

G. A. Sexton

Electric circuits of the automobile; battery ignition; generator, starting motor, lighting, horn and accessory circuits; tune-up, trouble diagnosis.

Prerequisite: Education 242F.

342B. (242B.) Industrial Arts—Woodwork **(2-4; 2-4)**

M. J. Tomlinson

Further development of proficiency in using hand tools. Use of woodworking machines of various types. Filing and fitting hand saws. Wood finish-

ing; further development in the application of various types of finishes (stained, shellacked, rubbed and waxed finishes).
Prerequisite: Education 242B.

342C. Industrial Arts—Electricity **(2-4; 2-4)**

R. H. CUNNINGHAM

Principles of alternating currents; single-phase induction motors; rectifiers; telephones; electronics; electro-magnetic waves; transformers.
Prerequisite: Education 242C.

342D. Industrial Arts—Metal Work **(2-4; 2-4)**

G. H. HARE

Non-ferrous metals and their alloys; metallurgy; machine shop practice; forging, welding, casting and heat treating continued; advanced drill press and bench work.

345. Typewriting Practice **(0-3; 0-3)**

GERALDINE FARMER

Required of candidates for the Junior Certificate in Business Education who hold either credit in Education 246 or the Junior Certificate in Typewriting. This course may not be presented for credit towards a degree.
Prerequisite: Education 246 or the Junior Certificate in Typewriting.

346. Teaching of Typewriting **(6L; 6L)**

GERALDINE FARMER

This course is designed to offer instruction in the pedagogical aspects of teaching typewriting to others, to provide an understanding of the curriculum in typewriting in the secondary school, and to increase competency in typewriting.
Prerequisite: Typewriting 20 of the High School with B standing, or equivalent.
NOTE: Students who hold the Junior Certificate in Typewriting may register in this course provided they do not already hold credit in Education 246.

347. Shorthand Practice **(0-3; 0-3)**

GERALDINE FARMER

Required of candidates for the Junior Certificate in Business Education who hold either credit in Education 248 or the Junior Certificate in Shorthand. This course may not be presented for credit towards a degree.
Prerequisites: Education 246 or the Junior Certificate in Typewriting; and Education 248 or the Junior Certificate in Shorthand.

348. Teaching of Shorthand **(6L; 6L)**

GERALDINE FARMER

This course is designed to offer instruction in the pedagogical aspects of teaching shorthand to others, to provide an understanding of the curriculum in shorthand in the secondary school, and to increase competency in shorthand.
Prerequisites: Typewriting 20 and Shorthand 20 of the High School with B standing, or equivalent.
NOTE: Students who hold the Junior Certificates in Shorthand and Typewriting may register in this course provided they do not already hold credit in Education 248.

350. Office Training (6L; 6L)

GERALDINE FARMER

Office practice. Study of forms used in everyday business, such as cheques, notes, drafts, invoices, statements. Study of banking, communication services, shipping services and transportation. Correspondence. Letters of application, introduction, recommendation, etc. Filing. Introduction to business machines. Prerequisite: Education 246 or Junior Certificate in Typewriting.

370Su. Teaching of Language to the Deaf (3-1; 3-1)

TO BE ANNOUNCED

Principles and methods employed in the development of oral and written language; vocabulary building; modifying linguistic handicaps of the deaf; relationship of language growth to mental, emotional and social maturation; employment of appropriate emotional materials; observation and laboratory experience.

372. Psychology and Education of Exceptional Children (3-0; 3-0)

TO BE ANNOUNCED

A survey of the psychology and education of the following types of atypical children: the child of low vitality, the crippled child, the child of defective vision or hearing, the child with defective speech, the epileptic, the delinquent child, the maladjusted child. The curricula, teaching methods and classroom organization for atypical children.

Prerequisite or corequisite: Education 476.

382. (282.) Observation and Student Teaching 12½ hrs. (for nine wks.)

S. A. EARL, S. A. LINDSTEDT AND STAFF

All students in B.Ed. programs will devote the afternoon periods of nine weeks to student teaching in assigned classrooms.

424. Diagnostic and Remedial Program (0-3; 0-3)

TO BE ANNOUNCED

A study of pre-school children. This will include the administration of intelligence tests, readiness tests, and reading tests, as well as the development of readiness programs.

436. Children's Theatre

438. Teaching English as a Second Language (3-0; 3-0)

TO BE ANNOUNCED

A course designed to acquaint teachers with approved methods of teaching English to young people and adults whose native language is not English.

441B. (341B) Industrial Arts—Woodwork 6 hrs. (half year)

R. H. CUNNINGHAM

Maintenance work (shop and equipment); refinishing; building construction. Prerequisites: Education 242B and 342B.

462. (362) Educational Administration (3-0; 3-0)

H. C. MELSNESS AND J. D. AIKENHEAD

For a description of this course, see Education 262. For holders of B.A. or B.Sc. degrees.

470Su Teaching Speech to the Deaf (3-1; 3-1)

To Be Announced

Importance of speech as a medium in the emotional social and mental development of deaf children; the organs of speech, their function and development; principles and methods used in developing speech; correction of acquired speech; development of useful and effective speech skills; utilization of residual hearing and other sensory avenues; auditory training and use of hearing aids; observation and laboratory experience.

472. Mentally Exceptional Children (3-0; 3-0)

To Be Announced

The psychology and education of mentally retarded and of gifted children, with special emphasis on organization, curricula and methods of teaching.
Prerequisite or corequisite: Education 476.

474. Education Clinic (3-3; 3-3)

W. B. Dockrell

(See Education 574.)

475. Psychology of Learning (B.Sc. Nursing, B.D.) (3-0; 0-0)

W. B. Dockrell

Analysis of learning process; psychology of skills, memory, reasoning, and emotion.

476. Educational Psychology

G. M. Dunlop, R. S. MacArthur and J. G. Woodsworth

Individual differences; psychology of learning and forgetting; motivation; personality, adjustment, and mental hygiene; introduction to evaluation and the testing program.
Prerequisite: Education 276, Psychology 202 or equivalent

478. Measurement and Evaluation (3-0; 3-0)

C. C. Anderson

Measurement of classroom achievement; teacher-made and standardized tests; interpretation and use of test results; evaluation of non-academic achievements; recording and reporting pupil progress.
Prerequisite: Education 276 or equivalent.

480. Curriculum and Teaching in the Secondary School (3-0; 3-0)

Staff

An examination and appraisal of curricula and teaching procedures in one of the following subjects. Prerequisite: Education 280S and two content courses in the chosen subject field; specific prerequisites may be required in some cases.
Science
Mathematics (pre- or co-requisite: Mathematics 270)

492. Philosophy of Education (3-0; 3-0)

H. S. Baker, B. E. Walker and A. L. Doucette

Philosophical bases of education, with particular reference to values, aims, curriculum, and the educative process.
Prerequisite: Philosophy 240, 260, 352, or 354 or 360. Philosophy 246 or 356 may be substituted by Roman Catholic students.

494. Principles and Practices of the School Program

To Be Announced

(Offered in summer session only.)

(Grades I to XII.)

The content of this course is to remain somewhat flexible so that individual needs of teachers registered in the course may be recognized.

II—Graduate Courses

Note: Graduate courses are numbered 500 and above. Not all are offered every year. Registration in these courses is normally restricted to graduate students.

500. Education Seminar

Staff

Reports and discussion by staff and graduate students to provide candidates for advanced degrees with experience in the selection and evaluation of research problems and procedures. The seminar will be offered as arranged. No course credit will be given.

502. Introduction to Educational Research (3-0; 3-0)

J. Macdonald

An introduction to quantitative and non-quantitative research; the applications of elementary statistics to the collection and analysis of data.

508. Problems in Educational and Vocational Guidance

C. M. Christensen

Problems in the prediction and guidance of academic success; theories and principles of vocational choice and vocational adjustment; applications of available knowledge and instruments to school guidance.

Prerequisite or corequisite: Ed. 308.

510. Counselling in Education (3-3; 3-3)

C. M. Christensen

Interview procedures; adapting the interview to scholastic, vocational, and personal guidance; laboratory practice with school children in the above procedures.

Prerequisite: Education 476.

514. Educational Sociology

B. Y. Card

A study of the school as a functioning institution in society with special attention to the status and role of school personnel, school group dynamics and control, and the educational implications of current trends in family living, social stratification, ethnic group relations, government, economics, religion.

518. Problems in Remedial Reading (3-0; 3-0)

Marion D. Jenkinson

The study of the auditory, visual, neurological, perceptual, mental and emotional factors which contribute to reading disability; the development of remedial techniques related to specific reading disabilities as they appear at the elementary, high school and college level.

This course is designed for reading supervisors and consultants, special teachers and tutors.
Prerequisite: Ed. 322A or Ed. 322B or appropriate section of 280S or permission of instructor.

520. Clinical Study of Remedial Reading (3-3; 3-3)

MARION D. JENKINSON

The clinical diagnosis of cases of severe reading disability; the remedial treatment of such cases as they appear at the elementary high school and college levels; evaluation of various tests and materials used in remedial reading, and the use of readability formulas; diagnostic and tutoring experience.
Prerequisite: Education 518.

522. Psychology and Supervision of Reading (3-0; 3-0)

DOROTHY M. LAMPARD

The nature of reading, and problems related to reading; evaluation and the measurement of achievement; diagnosis through the use of informal and standardized tests; remedial programs and materials; a minimal program to meet the needs of those in supervisory positions; the review and application of research studies.
Prerequisite: Education 322A or 322B; or permission of the instructor.

525. Educational Supervision (0-0; 3-0)

J. H. M. ANDREWS

A half year course containing topics selected from those listed in the description of Education 526.

526. Educational Supervision (3-0; 3-0)

J. H. M. ANDREWS

The principles, problems and procedures of democratic educational supervision. The following will be included: the function of the supervisor; personnel administration; the development and maintenance of morale; group process and staff meetings; studying and improving the teaching-learning situation; evaluating the objectives, methods and outcomes of the educational process; special problems of the supervisor arising from departmentalization in the high school, and from the enterprise in elementary schools.

528. The Learning and Teaching of Mathematics in Elementary and Junior High School (3-0; 3-0)

D. H. CRAWFORD

The development of the concept of number, (historical and psychological); review of recent research in learning and teaching mathematics; appraisal of programs and instructional materials.
Prerequisite: Education 328 or 480 (Mathematics).

559. Administration of Public Education in Canada (3-0; 0-0)

H. T. SPARBY

A half year course containing topics selected from those listed in the description of Education 560.

560. Administration of Public Education in Canada (3-0; 3-0)

H. T. Sparby

A comparative study of the educational systems of the ten Canadian provinces, with special attention to administrative organization and control. The form, function and powers of central and local educational authorities, and their relationship to one another. Centralized versus decentralized control. School law. Educational activities of the Dominion Government. Current trends and administrative problems in Canadian education.

561. Principles of Educational Administration (3-0; 0-0)

A. W. Reeves

A half year course containing topics selected from those listed in the description of Education 562.

562. Principles of Educational Administration (3-0; 3-0)

A. W. Reeves

Administration analyzed into its major activities, planning, organizing, directing, co-ordinating and controlling. Illustrations of these activities in the field of education. Relationship of school administration to political science, law, business administration, sociology and psychology. Importance of a guiding philosophy. Influence of democratic ideology on administrative theory and practice. Basic principles of school administration and their application to typical administrative problems.

563. Administrative Role of Principals and Superintendents (0-0; 3-0)

To Be Announced

A half year course containing topics selected from those listed in the description of Education 564.

564. Administrative Role of Principals and Superintendents (3-0; 3-0)

To Be Announced

The functions of the principal with particular attention to matters such as: administrative relationships within the school system, school and staff organization, professional leadership, administering the instructional program, pupil personnel and adjustment services, student organizations and activities, administration of the school plant and supplies, office management, records and reports. The principal as a public relations officer.

566. Educational Finance (3-0; 3-0)

G. L. Mowat

Sources of school revenue and analysis of expenditures. Provincial school grants in Canada. The case for federal aid. Plans for equalizing the financial support of public education and major problems involved in their implementation. Principles and practices in the budgeting of school funds. Financial accounting and reporting. Capital expenditures. Salary schedules. Cost analysis.

568. School Buildings and Pupil Transportation (3-0; 3-0)

G. L. Mowat

School building surveys. Planning the school plant and supervising its construction. Site development for school and community use. Operation,

utilization and maintenance of the school plant. Evolution of pupil transportation. Planning bus routes. The driver and his duties. Bus standards. Accounting procedure and cost analyses. Studies of actual building and transportation problems confronting school boards in Alberta.

570. Child Psychology (3-0; 3-0)

To Be Announced

A systematic study of the growth, development, behavior and problems of adjustment of children of pre-school and elementary school ages.
Prerequisite: Education 476.

572. Psychology of Adolescence (3-0; 3-0)

To Be Announced

A systematic study of the growth, development, behavior and problems of adjustment of children of junior and senior high school ages.
Prerequisite: Education 476.

574. Education Clinic (3-3; 3-3)

W. B. Dockrell

Training in the measurement of intelligence, achievement, interests, aptitudes and adjustment of school children. Laboratory experience in the Education Clinic in measurement, diagnosis and remedial treatment of school children.
Prerequisite: Education 476.

576. Methods of Educational Research (3-0; 3-0)

J. Macdonald

The nature of scientific thinking; methods and techniques of educational research; applications of these methods and techniques to educational research.
Prerequisite: Education 476.

578. Advanced Testing and Measurement (3-0; 3-0)

R. S. MacArthur

The application of elementary statistics to problems of measurement and research education. The theoretical basis of measurement of achievement. intelligence, interests, aptitude and adjustment; the examination and evaluation of group and individual tests in these areas.
Prerequisite or corequisite: Statistics 255.

580. Curriculum Development (3-0; 3-0)

H. S. Baker and W. H. Worth

Curriculum research, theory and practice with particular reference to curriculum aims, content, organization, and change.

594. History of Education (3-0; 3-0)

B. E. Walker

History of education from the Greeks to modern times, placing emphasis on great figures and major trends. The history of modern education in Canada, Britain, America, France, Germany, Denmark and Russia. Great issues in education: The influence of political, economic, social and religious institutions on education; theories of the role of education in the modern state; philosophy and education; psychology and education.

III—Graduate Conference Courses

NOTE: Registration in courses numbered 600 and above is restricted to graduate students; in each course, credit is given acording to work done, to a maximum of six hours. Not all are offered every year.

626. Educational Supervision

660. The Organization and Government of Public Education

662. Problems of Educational Administration and Supervision

664. The Administrative Role of Principals and Superintendents

666. Educational Finance

670. Developmental Psychology

STAFF OF THE DIVISION OF EDUCATIONAL PSYCHOLOGY

674. Problems of Adjustment of School Children

C. C. ANDERSON

676. The Psychology of Learning

G. M. DUNLOP

678. Educational Measurement and Experimental Research

R. S. MACARTHUR

680. Teaching in the Secondary School

Theory and research in a selected subject-matter field or fields.

682. Elementary Education

Advanced study of current problems and trends in elementary education.

692. Philosophy of Education

Issues in modern education; critical analysis of educational theories; problems of consensus.

Prerequisite: Education 492 or the equivalent.

696. Comparative Education

Study of selected school systems. Social, religious, economic and other influences on education. Curriculum and teaching.

ART

Miss Stadelbauer and members of the staff of the Department of Fine Arts, Faculty of Arts and Science.

230. (35.) Principles of Design and Composition (1-4; 1-4)

E. N. YATES AND HELEN STADELBAUER

The study and practical application of principles of composition and picture-making, methods of construction in design, and the use of conventional and abstract forms.

Textbook: Rasmusen, *Art Structure.*

240. (40.) Fundamentals of Drawing (3-3; 3-3)

H. G. GLYDE AND N. YATES

Theory and practice of drawing; analysis of masters' drawings; study of line,

form, pattern, light and shade; portrait and figure construction; life drawing, using both long and quick poses.
Textbook: Nicolaides, *The Natural Way to Draw*

250. (42) Fundamentals of Painting (3-3; 3-3)

J. B. TAYLOR

Theory and practice of painting in oils; forms in space; analysis of line, pattern and form in painting; study of arrangements, both two-dimensional and three-dimensional; use of light and shade; application of pigments in both monochrome and color.
Prerequisite: Art 240.

300. (51.) Art History and Appreciation (3-0; 3-0)

J. B. TAYLOR

A general survey of architecture, painting and sculpture and minor arts in the following periods: Primitive, Egyptian, Greek, Etruscan, Roman, Byzantine, Celtic, Romanesque, Gothic and Italian Renaissance.
Analysis of compositions by the great masters of the various schools of painting.
Textbook: Gardner, *Art Through the Ages.*

330. (53.) Pictorial Composition (2-3; 2-3)

J. B. TAYLOR

Analysis of master compositions from the various schools of painting; theory and practice in arranging forms, both in the two-dimensional and in space; exercises in figure grouping; conventional treatment of natural forms for decorative painting; uses of various techniques.
Prerequisite: Art 230 (for Education students).

400. (61.) Art History and Appreciation (3-0; 3-0)

E. N. YATES

Survey of art in Europe from Renaissance to modern times.
Analysis of architecture, sculpture, painting and graphic arts of the following periods: Flanders and Germany, fourteenth to sixteenth centuries; Spanish, fifteenth to eighteenth centuries; Dutch, English and French, sixteenth to nineteenth centuries.
Modern schools, French, English, American, Canadian, etc.
Textbook: Gardner, *Art Through the Ages.*

450. (62.) Advanced Painting (2-4; 2-4)

E. N. YATES AND J. B. TAYLOR

Painting from the model: portrait, figure and costume; lectures on painting techniques used by the masters of the Renaissance and modern schools; theory and practice of applying pigments on various grounds in both direct and indirect methods.
Prerequisite: Art 250.

BOTANY

Staff of the Department of Botany, Faculty of Arts and Science.

205. Natural History of Alberta Plants (3-3; 3-3)

LORENE L. KENNEDY

Basic features of plant structure, development and classification. Life habits of important plant groups with special reference to native plants and plants of economic importance. Outstanding characteristics of the vegetation of Alberta.

DRAMA

Staff of the Division of Drama, Department of Fine Arts.

250. (35.) Elementary Acting and Stagecraft (3-3; 3-3)

F. BUECKERT AND G. PEACOCK

(a) *Acting*: Practical and theoretical through improvizations, stage performance and discussion. Emphasis is placed on the development of the actor through preparation for a role, acting scenes, and basic speech and body work. Elementary makeup.

(b) *Stagecraft*: Construction and painting of scenery; lighting; costumes; some reference to design.

Textbook: Milton Smith, *Play Production.*

300. (51.) History of the Theatre to Middle of Nineteenth Century (3-0; 3-0)

G. PEACOCK

Emphasizes production methods, the structure and background of plays and other theatrical productions. A considerable amount of outside reading will be assigned throughout the year, including the reading of plays and critical essays.

Textbook: Gassner, *Masters of the Drama.*

(Offered alternate years. Offered in 1960-61.)

350. (53.) Advanced Acting (3-3; 3-3)

G. PEACOCK

(a) Further study and exercises in character creation, voice production, development of acting techniques.

(b) 1. Practical work in major productions and one-act plays.

2. Training in the styles of acting: Contemporary, Restoration, Shakespearean, Greek.

Preerequisite: Drama 250.

360. (40.) Voice and Speech (3-0; 3-0)

F. BUECKERT

This is an introductory course in speech with emphasis upon oral interpretation. The first session will be devoted to a discussion of the importance of our spoken language, a study of the vocal mechanism and causes of poor phonation, and practice in the proper production of voice and speech. The second session will be concerned with the expression of personality through speech, audience psychology, oral interpretation and practice, with

some reference to other speech situations. Before registering in this course students must obtain the consent of the instructor.

400. (52.) The Modern Theatre (3-0; 3-0)

G. Peacock

The development of the modern theatre from Ibsen to the present day. The aesthetics of the theatre. A considerable amount of outside reading will be assigned throughout the year, including the reading of plays and critical essays.

Textbook: Gassner, *Masters of the Drama.*

(Offered alternate years. Not offered in 1960-61.)

450. (55.) Stage Direction (3-3; 3-3)

F. Bueckert

(a) A study of the problems of play selection, casting, preparation of a script and conduct of rehearsals; techniques involved in production.

(b) Practical

1. Each member of the class is given the opportunity to work with the director of a major production in a responsible capacity.
2. In the second term the class will be responsible for the direction of several one-act plays.

Prerequisite: Drama 250.

Textbook: Alexander Dean, *Fundamentals of Play Production.*

ENGLISH

Staff of the Department of English, Faculty of Arts and Science.

200. (2.) A First Course in English Literature (3-0; 3-0)

Members of the Department

A close study of representative masterpieces, with some attention to the historical development of English literature. Essays and practice in setting down ideas in good English.

Texts: Chaucer, the General Prologue and selections from the *Canterbury Tales; Everyman;* Malory, selected tales; Marlow, *Dr. Faustus;* Shakespeare, *King Lear;* Jonson, *Volpone;* Spenser, *The Faerie Queene,* Book One; Donne, selected poems; Milton, *Samson Agonistes, Ode on the Morning of Christ's Nativity, Lycidas;* Dryden, selected poems and *An Essay of Dramatic Poesy;* Congreve, *The Way of the World;* Pope, selected poems; Swift, *Gulliver's Travels;* Addison and Steele, essays; Fielding, *Tom Jones;* Johnson, *Preface to Shakespeare, Life of Pope;* Boswell, selections from *The Life of Samuel Johnson;* Vallins, *Good English.*

230. (5E.) English Language and Literature (3-0; 3-0)

Members of the Department

English 5E is a course in English designed to increase appreciation of good literature and to instruct students in the basic principles of good essay writing. (Students who prefer a chronological or historical approach should take English 200).

Texts: *College Survey of English Literature* (Harcourt, 1951); Forster,

Passage to India; Shakespeare, *Othello* (Kittredge); Hodges, *Harbrace College Handbook* (4th Edition, Harcourt Brace).

398. (54.) Children's Literature (3-0; 3-0)

ALISON G. WHITE

A historical and critical study of literature written for children, with attention to the interaction between children's literature and educational theory. The course will bring to the attention of prospective elementary teachers some of the world's resources in good books for children.

Text: *The Arbuthnot Anthology of Children's Literature* (Scott Foresman Co.)

Prerequisite: English 200 or 230. This course is limited to B.Ed. students in the elementary route.

HOUSEHOLD ECONOMICS

Staff of the School of Household Economics.

202. (12.) Textiles and Clothing (3-3; 3-3)

F. M. T. ZINTEL

A study of the composition, manufacture and properties of fabrics, their use and care. The selection of clothing in relation to the individual. The use of commercial patterns in garment construction. Fitting. Sewing techniques as they apply to specific fabrics and to various types of garments.

Textbooks: *Textiles,* Hollen, N. and Saddler, J.

210. (11.) Foods and Nutrition (3-3; 3-3)

M. CAMPION

An elementary study of the composition and nutritive value of foods, with laboratory practice in food preparation, meal planning and service.

Textbook: Hughes, *Introductory Foods.*

350. (45.) Applied Art (3-3; 3-3)

A study of the principles of design and the theory of color. Creative problems including block printing, stencilling, stitchery, and other techniques. Historic styles of architecture and funiture and their relation to modern design. The planning of a contemporary house and its furnishings.

Textbook: *Art in Everyday Life,* Goldstein, H. and Godlstein, V.

450. (44.) Nutrition and Economics of the Household (3-3; 3-3)

The principles of nutrition applied to the feeding of the family. The history of family life; family relationships; standards of living; household production; the income and its expenditure; budgets; consumer education.

Prerequisites: H.Ec. 210 and Chem. 250 or 350.

Textbooks: *Basic Nutrition,* McHenry; *Family Finance,* Bigelow.

460. (46.) Advanced Clothing (3-3; 3-3)

The study of historic and contemporary costume design. The development of the foundation pattern. Flat pattern designing, draping and tailoring for selected garments and construction in appropriate fabrics.

Prerequisite: H.Ec. 202, and H.Ec. 350.

Textbook: *Clothing Construction,* Mansfield, E.

460Su. (46Su.) Advanced Clothing (3-3; 3-3)

The study of historic and contemporary costume design. The development of the foundation pattern. Flat pattern designing for selected garments and construction in appropriate fabrics.

Prerequisite: H.Ec. 202.

Textbook: *Clothing Construction,* Mansfield, E.

MUSIC

Dr. F. E. Churchley and members of the staff of the Department of Fine Arts, Faculty of Arts and Science.

200. (35 or 41) History of Music and Choral Technique (2-3*; 2-3*)

R. S. Eaton and F. E. Churchley

Elementary theory and practice of singing, choral technique and interpretation, sight singing and ear training. History of music. Introduction to form. Instruments of the orchestra. Assignments include one hour weekly of prescribed listening; records and scores are provided and the listening room is reserved at various times for small groups. Weekly reading will be assigned, part of it related to the listening.

Theory: The student will be required in February (of the session in which the course is taken), to pass an elementary examination in notation with 80% standing.

Textbooks: Staton, *Sweet Singing in the Choir;* Martin Bernstein, *An Introduction to Music;* Horwood, *Basis of Music.*

*Laboratory: Choral and listening.

Prerequisite: (a) Western Board of Music Grade III theory or equivalent, *and*
(b) Western Board of Music Grade V practical or equivalent.

250. (45) Elementary Harmony and Counterpoint (2-3*; 2-3*)

T. Rolston and F. E. Churchley

Strict and free counterpoint in two and three parts. Diatonic harmony, including secondary sevenths. Modulation. Use of unessential notes of all kinds. Harmonizing of chorales in the style of Bach. A detailed study of musical form and analysis.

*Laboratory: Form; ear training and keyboard harmony; choral.

Textbooks: Dyson, *Musicianship for Students,* Book I; Macpherson, *Form in Music.*

300. (51) History of Music (2-3*; 2-3*)

R. S. Eaton and F. E. Churchley

A study of the history of music from the year 1600 to 1900. Scores and recordings of music are provided. A critical evaluation of the styles of the various composers is emphasized. Detailed study of form and analysis.

*Laboratory: Listening; choral.

Textbooks: Finney, *A History of Music;* Macpherson, *Form in Music.*

Prerequisite: Music 35 or 41 or 200 or equivalent.

301. Instrumental Technique (0-2; 0-2)

A class in the study of brass, woodwind and stringed instruments as applied to band and orchestral groups. B.Ed. students must study this course concurrently with Music 300.

PHYSICAL EDUCATION

Members of the staff of the School of Physical Education.

200. (102.) Physical Education in the Elementary Grades (1-2; 1-2)

A. M. Carson

The theory, practice and teaching of physical education in the primary and elementary grades. Activities will include games of low organization, story plays, simple team games, folk dancing, rhythmics, self-testing stunts, tumbling and pyramid building.

201. Physical Education for Grades VII to XII (0-2; 0-2)

A. F. Affleck, A. M. Carson, M. F. Smith

An introduction to the theory and practice of physical eductaion in the junior and senior high schools. Theory will include the purposes of physical education, principles of efficient movement, principles of learning as applied to physical education, the organization of lesson plans, yearly programs, including intramural and interscholastic programs, and special events. Activities will include fitness and conditioning exercises, soccer, track and field, volleyball, basketball, hockey and skating, social and folk dance, apparatus, stunts and tumbling.

203. (101.) Physical Education for Grades I to IX (0-2; 0-2)

Physical Education Staff

An introduction to the theory and practice of physical education in the elementary and junior high school. Theory will include the purposes of physical education, mechanical principles of efficient movement, physiological principles of learning as applied to physical education, the organization of lesson plans, yearly programs, tournaments and special events such as play days. Activities will include games of low organization, lead-up games, stunts and tumbling, rhythmics, social and folk (including square) dancing, volleyball, soccer and track and field.

209. (109.) Activity Course (For Education Majors and Minors only) (0-0; 0-3)

P. Austin

Theory, practice and teaching of rhythmics, social and folk dancing, badminton, and volleyball.

Prerequisite or corequisite: Physical Education 201.

212. (106.) Activity Course (For Physical Education Majors Only) (0-3; 0-3)

Physical Education Staff

Theory, practice and teaching of football, basketball, tumbling and apparatus for men, and skating, basketball, tumbling and apparatus for women.

243. (103.) Introduction to Physical Education (3-0; 0-0)

M. L. Van Vliet

A survey of the field of physical education, with emphasis on factual information directed toward the development of a scientific program. This course will include a brief study of the history of physical education as well as underlying philosophies.

295. (105.) School Health Education (2-0; 2-0)

A. W. E. Eriksson and J. Frache

Principles of teacher, pupil and classroom health. Interpretation of the health programs for the elementary and junior high schools.

324. (224.) Activity Course (For Education Majors and Minors only) (0-3; 0-3)

Physical Education Staff

Theory, practice and teaching of softball, archery, track and field, and soccer. Principles of officiating.

392. (202.) Public and Personal Health Problems (3-0; 3-0)

A. W. E. Eriksson

Background of health knowledge for the high school course, with emphasis on provincial and national health problems. Nutrition, sanitation and recent developments in the field of health. Personal health problems of the high school age group. First aid.

442. (302.) Organization and Administration of Health and Physical Education (3-0; 3-0)

M. L. Van Vliet

An analysis of factors involved in planning, directing, staffing, co-odinating, budgeting and reporting with respect to comprehensive junior and senior high school programs in health instruction, the required program, intramural sports and interscholastic athletics.
Prerequisite: Phys. Ed. 243.

Notes: 1. In the Summer Session of 1960 and alternate years, the following courses will likely be offered: P.E. 212 and P.E. 442.

2. In the Summer Session of 1961 and alternate years, the following courses will likely be offered: P.E. 243, P.E. 209, and P.E. 324.

ZOOLOGY

Members of the staff of the Department of Zoology, Faculty of Arts and Science.

222. (5Su.) Natural History of Alberta Animals (3-3; 3-3)

To Be Announced

Identification and natural history of the more common vertebrate and invertebrate animals found in Alberta; outline of classification; methods of collection and preservation; care of captive animals; other aspects of natural history techniques.

(Summer Session Only.)

SPECIAL CERTIFICATES IN OPTIONAL SUBJECTS

Special certificates in art, business education, dramatics, home economics, industrial arts, primary, music, and physical education are available under conditions set out in the following pages. At some levels, special certificates are required.

In many instances requirements may be met in the course of regular programs leading to the B.Ed., M.Ed., Ed.D. or Ph.D. degrees.

In the tables on the following pages all special certificates are listed, together with the credit requirements. For greater detail regarding special certificates in Administration, Guidance and Business Education, see Section XII.

SPECIAL CERTIFICATES

Subject and Certificate	Requirements for Certification
ADMINISTRATION—	Ed. 525, Ed. 559, Ed. 561, Ed. 563, plus two senior or graduate courses in Arts or Education as approved by the Division of Educational Administration with a mark of 65 or better required in each course or half course; a permanent professional teaching certificate.
ART—	
Junior	Ed. 151 or Ed. 251 or Ed. 252 or the art section of Ed. 280S and Art 230.
Senior	Junior Certificate plus Art 300 or Art 400 and Art 330.
BUSINESS EDUCATION—	
Junior Certificate	Accounting 200. Ed. 246 with Ed. 345, **or** Ed. 346. Ed. 248 with Ed. 347, **or** Ed. 348. The Junior Certificate qualifies the holder to teach all typewriting, stenography and bookkeeping options to the end of Grade XII.
Senior Certificate	The requirements for the Junior Certificate **and** Education 350 and Commercial Law. The Senior Certificate qualifies the holder to teach all business education options of the high school program.
Advanced Certificate	The B.Com. degree and the Senior Certificate in Business Education.
DRAMATICS—	
Junior	Ed. 255 or the drama section of Ed. 280S, and Drama 250.
Senior	Junior Certificate plus Drama 450 and **one** of Drama 300, 350, 400 or Ed. 436.
GUIDANCE—	
Junior	Ed. 276; Ed. 308 or 310; one of Ed. 310 or 308, 474, 478; permanent teaching certificate.
Senior	Junior certificate; Ed. 474-574 or 510; Ed. 508 or 526; Ed. 478 and 576, or Math. 255 and Ed. 578; permanent professional certificate; two years' experience as a counsellor.
HOME ECONOMICS—	
Junior	H.Ec. 202 and H.Ec. 210
Senior	Two of H.Ec. 350, 450, 460 in addition to the requirements for the Junior Certificate.
Advanced	Teacher's certificate carrying Grade XII teaching privileges, together with B.Sc. in H.Ec. degree.

Subject and Certificate	Requirements for Certification
MUSIC—	
Junior	Ed. 153 or 253 or Ed. 254 or the music section of Ed. 280S, and Music 200.
Senior	Junior Certificate plus Music 250 and Music 300.
PHYSICAL EDUCATION—	
Junior	Phys. Ed. 200, 201 or 203, 209, 243, 295, 324.
Senior	Phys. Ed. 442, P.E. 312, plus the Junior Certificate.
Advanced	B.Ed. in Physical Education degree or B.P.E. degree and appropriate general certification up to and including the Grade XII level.
PRIMARY—	(a) Ability to play the piano with sufficient skill to satisfy ordinary demands when teaching songs and rhythms. (b) Ed. 276 or equivalent. (c) Ed. 284, 286 and 288; or 280E; or successful teaching experience in the primary grades. (d) Art 230, Ed. 252 or equivalent. (e) Music 200, Ed. 254 or equivalent. (f) English 398 (Children's Literature). (g) **One** of Ed. 322A or Ed. 324. (h) **One** of Ed. 324, 328, 224, 322A.

Note: For information concerning the special certificates required for the teaching of specific high school subjects, teachers should consult the current editions of the junior high school and senior high school handbooks.

CERTIFICATION OF INDUSTRIAL ARTS TEACHERS

Grade of Certificate	Requirements for Certification	Teaching Validity
JUNIOR CERTIFICATE IN INDUSTRIAL ARTS	(a) Credit in Ed. 241A, 242B, 242C, 242D.	Industrial Arts options in Grades VII to XII.
SENIOR CERTIFICATE IN INDUSTRIAL ARTS	(b) Credit as for Junior Certificate plus Ed. 242F, and two of 342B, 342C, 342D.	Industrial Arts options in Grades VII to XII.
ADVANCED CERTIFICATE IN INDUSTRIAL ARTS	(c) Credits equivalent to shop courses of regular B.Ed. (I.A.) program (10 courses).	Industrial Arts options in Grades VII to XII.
SPECIALIST SENIOR CERTIFICATE IN A UNIT SHOP SUBJECT	(d) For students registered in Route 2: completion of the Special second year.	Unit shop option in the field of specialization for Grades VII to XI.
	(e) For students registered in Route 3: completion of the approved second year for graduates of the Institute of Technology and Art.	Unit shop option in the field of specialization for Grades VII to XI.
	(f) For students registered in Route 1: completion of the third year with specialization in a unit shop subject.	Unit shop option in the field of specialization for Grades VII to XII.
SPECIALIST ADVANCED CERTIFICATE IN A UNIT SHOP SUBJECT	(g) For students registered in Route 2: possession of Journeyman's qualifications and completion of the Special third year.	Unit shop option in the field of specialization for Grades VII to XII.
	(h) For students registered in Route 3: possession of Journeyman's qualifications and completion of the approved third year for graduates of the Institute of Technology and Art.	Unit shop option in the field of specialization for Grades VII to XII.
	(i) For students registered in Route 1: possession of Journeyman's qualifications and completion of the third year with specialization in a unit shop subject.	Unit shop option in the field of specialization for Grades VII to XII.

NOTES:

1. Special subject certificates are issued only to holders of the appropriate general teaching certificates. (Junior E, Standard E, Standard S, or Professional.) The latter control the grade level to which any teacher is licensed to teach.
2. A candidate for a non-specialist certificate will ordinarily enrol in the secondary B.Ed. program, with a major in Industrial Arts.
3. A candidate for a specialist certificate should hold a journeyman's qualification recognized by the Alberta Apprenticeship Board, or become a registered apprentice early in the training program.

XII

The Faculty of Engineering

INFORMATION, REGULATIONS, COURSES

ACADEMIC STAFF OF FACULTY OF ENGINEERING

Dean—G. W. Govier
Associate Dean—L. E. Gads*
Assistant Dean—J. Longworth (1960-61)

Department of Chemical and Petroleum Engineering

Professors—D. B. Robinson (Head of Department), G. W. Govier
Associate Professors—I. J. Dalla Lana, P. M. Dranchuk,* D. L. Flock, D. Quon, R. A. Ritter
Assistant Professors—R. T. Hart, W. Nader
Sessional Instructors

Department of Civil Engineering

Professors—S. R. Sinclair (Head of Department), T. Blench, L. E. Gads
Associate Professors—W. L. Bigg, P. H. Bouthillier, E. L. Fowler, J. Longworth, A. W. Peterson, W. W. Preston, W. H. Stillwell (Calgary)
Assistant Professors—K. O. Anderson, R. W. Ansley, J. J. Bakker, M. J. Baron, E. W. Brooker, A. J. Celis, P. Glockner (Calgary), J. G. MacGregor, S. H. Simmonds,* J. P. Verschuren, J. Warwaruk
Sessional Instructors

Department of Electrical Engineering

Professors—J. A. Harle (Head of the Department), J. W. Porteous
Associate Professor—R. E. Phillips
Assistant Professors—K. G. Clarke, Y. J. Fokkinga, D. H. Kelly, R. W. King
Sessional Instructors

Department of Mechanical Engineering

Professor—G. Ford (Head of the Department)
Associate Professors—J. Duby, J. S. Kennedy, D. Panar, G. W. Sadler, H. R. McArthur (Calgary)
Assistant Professors—A. G. Doidge (Calgary), R. H. B. Hibbert (Calgary), E. W. Johnson, C. M. Rodkiewicz, J. B. Haddow*
Sessional Instructors

Department of Mining and Metallurgy

Professors—E. O. Lilge (Head of the Department), J. G. Parr, T. H. Patching
Associate Professor—J. Leja
Assistant Professor—W. V. Youdelis
Sessional Instructors

*On leave of absence.

FACULTY OF ENGINEERING

The Faculty of Engineering administers regular four-year programs leading to the B.Sc. Degree in Chemical, Civil, Electrical, Mechanical, Metallurgical, Mining, and Petroleum Engineering. Special patterns are available in the third and fourth years of some of these programs. In addition, for students obtaining a sufficiently high standing in the work of the first two years programs are available leading to the B.Sc. Degree in Engineering Physics. Details of all these courses appear on pages 48 to 62. Instruction in the first two years of Engineering is offered both at the Calgary and the Edmonton campus of the University. Instruction in the third and fourth years of Engineering is available only at the Edmonton campus.

A six-year program leading to the degrees of B.A. and B.Sc. may be arranged for students having a sufficiently high High School standing. Details of this course appear in the calendar of the Faculty of Arts and Science.

Graduate work leading to the M.Sc., and in some cases the Ph.D., degree is offered through the various Engineering Departments under the administration of the Faculty of Graduate Studies. Details of these programs appear in the calendar of the Faculty of Graduate Studies.

ADMISSION REQUIREMENTS FOR PROGRAMS LEADING TO THE B.SC. DEGREE IN ENGINEERING

1. For students who have attended and are completing High School in Alberta, examinations for admission to the University are conducted each year, in June and August, under the authority of the High School and University Matriculation Examination Board. Applications for these examinations should be made about two months before the date of examinations to the Chairman of the High School and University Matriculation Examinations Board, Department of Education, Government Buildings, Edmonton.
2. The standard required for admission to the first year of Engineering is—
   (a) an Alberta High School Diploma with
   (b) a "B" or higher standing in each of the following seven courses:
      (1) Chemistry 30*
      (2) English 30
      (3) French 30, or German 30, or Latin 30
      (4) Mathematics 30
      (5) Mathematics 31
      (6) Physics 30
      (7) Social Studies 30, and
   (c) an average in these courses, excluding Mathematics 31, of at least 60%.
3. Students who have completed their High School work in Alberta in 1959 or earlier and who have met the admission requirements in effect at the time of their High School graduation will be given special consideration.

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*Students who have passed Chemistry 30 without approved laboratory will be required to satisfy the Department of Chemistry as to their proficiency in laboratory work.

4. To provide only for students who have followed the curriculum in the schools of Alberta to the High School Graduation Diploma without being able to obtain all the required courses because such courses have not been available in their local schools, the Faculty of Arts and Science offers courses at the Grade XII level corresponding to French 30, Latin, 30, German 30, Chemistry 30, Mathematics 31 and Physics 30. A maximum of two of these courses (except Mathematics 31) may be taken during the Summer Session by students holding an Alberta High School Diploma and having a B or higher standing in their courses which must include English 30, Social Studies 30, and Mathematics 30. A student who is deficient only in one or two of French 30, Latin 30, German 30, Chemitsry 30, Mathematics 31 or Physics 30 may qualify himself for admission to the Faculty of Engineering through attendance at a summer session.
5. Students who have completed their High School work outside Alberta will be judged on the Alberta matriculation standard with their High School credits being evaluated by the Registrar and the Dean.

PROCEDURE FOR APPLYING FOR ADMISSION

1. Students who have not previously been registered in the Faculty of Engineering should write to the Registrar and request the application forms and descriptive material.
2. Students who completed the bulk of their high school work two or more years prior to the time of application are required to consult the Dean and the Students Counselling Service by July 31st.
3. The application forms should be completed in all detail and submitted with the appropriate fee* to the Registrar before August 31st.
4. Students are required to arrange with the Examinations Branch of the Department of Education of the province where their High School Training was obtained for the direct transmission by the Department to the Registrar of two copies of the complete transcript of their High School work.
5. Application must be complete and accompanied by copies of the transcript before they can be accepted. They will be reviewed by the Registrar and the Dean and the applicant will be notified by the Registrar of his acceptability or otherwise.
6. Students who have previously registered in the Faculty of Engineering are not required to reapply for admission to subsequent years and may assume that they are readmissible unless they have been otherwise informed by the Registrar or the Dean.

REGISTRATION

1. All students must register in person at the prescribed time before the start of classes.
2. Students who have been admitted to the Faculty of Engineering for the first time will be informed of the time and place of registration by the Registrar at the time they receive notice of admission.

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*A fee of $5.00 is charged for the evaluation of high school documents from provinces other than Alberta; a fee of $10.00 is charged for the evaluation of high school documents from outside Canada.

3. A student is responsible for the completeness and accuracy of his registration. He is also responsible for any adjustment of registration made necessary by the results of supplemental examinations. Particular care should be exercised with regard to the selection of options and patterns where they are available. Registration in courses which directly conflict on the timetable will only be allowed when the permission of the Dean has been secured.
4. Students with registration problems are requested to consult the Dean.
5. Late registration is permitted only in exceptional cases and with the approval of the Dean. If late registration is approved a late registration fee of $3.00 plus $1.00 per day is levied.
6. Registration is incomplete until fees have been paid, and is subject to cancellation unless payment has been made by the final date according to regulations which follow.

PROMOTION REGULATIONS OF FACULTY OF ENGINEERING

1. A student who has obtained credit in all but one of the courses prescribed for him in any year may be permitted registration in the subsequent year of the program but, if so, will be required to re-register and repeat the failed course.
2. A student who has not obtained credit in all or all but one of the courses prescribed for him in any year is considered to have failed his year and will be denied registration in the subsequent year of the program.
3. A student who has failed two or more of the courses prescribed for him in any year may under special circumstances be permitted to repeat the failed year. Credit may be given in one or more courses previously taken and passed with a grade of 65 percent or higher. In such cases the student may be required to register in additional courses not more than one of which may be a course prescribed in a subsequent year of his program.
4. A student who has obtained credit in all of the courses prescribed for him in the second year of a program may be permitted registration in the third year of a different program but, if so, will be required to register in any course prescribed for the second year of the new program in which he does not have credit.
5. A student will be denied further registration in Engineering if after three academic years he has not qualified for registration in the third year of his program.

WEIGHTING OF GRADES

In the computation of student averages for scholarship and other purposes the grades obtained in individual courses are weighted in accordance with weighting factors representing the sum of

(a) the number of hours per week of lectures for each term, plus

(b) from one-third to one-half the number of hours per week of laboratory for each term.

FIRST YEAR ENGINEERING
All Programs

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 150	Surveying	2	0	2	0
C.E. 151	*Survey Field Work	0	0	0	0
Eng.P. 159	Orientation to the Engineering Profession	1	0	0	0
Chem. 232	Modern Chemistry	3	4	3	4
E.M. 150	Engineering Mechanics	3	0	3	0
Graphics 150	Graphics	2	4	2	4
Math. 202	Elementary Mathematics	3	2	3	2
Phys. 238	Physics	3	2	3	2
Phys. Ed.	Physical Education	0	2	0	2
	Total Hours—	17	14	16	14

*Survey School, 3½ weeks duration after the end of final examinations in preceding courses.

SECOND YEAR ENGINEERING
Required Courses — All Programs

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 250	Astronomy	2	3/2	2	3/2
C.E. 260, 261	Strength of Materials	2½	3/2	2½	3/2
Ch.E. 251	Engineering Materials	2	0	2	0
E.M. 250	Engineering Mechanics	3	0	3	0
Geol. 232	Geology	2	3/2	2	3/2
Math. 303	Calculus	3	2	3	2
Phys. 340	Magnetism, Electricity and Light	3	3/2	3	3/2
	Subtotal Hours—	17½	8	17½	8

Additional Courses: Chemical, Petroleum, Mining and Metallurgical Engineering

Chem. 311	Quantitative Analysis	2	3/2	0	0
Chem. 371	Physical Chemistry	0	0	3	3/2
	Total Hours—	19½	9½	20½	9½

Additional Course: Civil and Mechanical Engineering

Graphics 250	Graphics	1	3	1	3
	Total Hours—	18½	11	18½	11

Additional Course: Electrical Engineering

E.E. 250	Principles of Circuitry	2	3/2	2	3/2
	Total Hours—	19½	9½	19½	9½

THIRD YEAR — CHEMICAL ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Ch.E. 361	Unit Operations I	2	3/2	2	3/2
Ch.E. 365	Industrial Stoichiometry	2	1	0	0
Chem. 350	Organic Chemistry	3	3	3	3
Chem. 470	Elementary Physical Chemistry	3	3/2	3	3/2
Econ. 302	Principles of Economics	3	0	3	0
E.E. 300	Elements of Elec. Engineering	2	3/2	2	3/2
Math. 404	Advanced Calculus	3	0	3	0
Pet.E. 380	Properties of Petroleum	0	0	2	3/2
	Total Hours—	18	8½	18	9

FOURTH YEAR — CHEMICAL ENGINEERING

Required Courses

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Ch.E. 461	Unit Operations II	3	5	3	5
Ch.E. 465	Chemical Process Industries	2	3/2	3	3/2
Ch.E. 467	Chemical Eng. Thermodynamics	3	1	3	1
Ch.E. 472	Colloquium	0	1	0	1
Ch.E. 473	Prac. Exper. and Summer Report	0	0	0	0
Ch.E. 474	Industrial Tour	0	0	0	0
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
Group A	Non-Tech. Option, one course	3	0	3	0
Group B	Two courses[1,2]	6	0	0	0
Group C	Two courses[1,2]	0	0	6	0
	Total Hours[2]—	17	8½	19	8½

(Optional Courses Applicable As Indicated Above)

Group A

A list of non-technical courses approved by the Department of Chemical and Petroleum Engineering. The list is available at the time of registration at the Department office.

Group B

Chem. 475	Advanced Physical Chemistry	3	3/2	0	0
Phys. 470[3]	Modern Physics	3	0	0	0
Ch.E. 466	Intro. to Instrumentation	3	0	0	0
Math. 458	Numerical Analysis and Modern Computational Methods	2	2	0	0

Group C

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Chem. 451	Physical - Organic Chemistry	0	0	3	3/2
Phys. 470(3)	Modern Physics	0	0	3	0
Ch.E. 464	Applied Reaction Kinetics	0	0	2	1
Math. 458	Numerical Analysis and Modern Computational Methods	0	0	2	2

NOTES:—

(1) Selection to be approved by Head of Department of Chemical and Petroleum Engineering.

(2) Hours are approximate depending upon optional courses selected.

(3) Continues through both terms.

THIRD YEAR — CIVIL ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 330, 331	Fluid Mechanics	2½	3/2	2½	3/2
C.E. 332	Hydrology	2	3	0	0
C.E. 340	Elements of Soil Mechanics	0	0	2	0
C.E. 360	Theory of Structures	0	0	3	0
C.E. 362	Elements of Structural Design	2	3	2	3
Economics 302	Principles of Economics	3	0	3	0
E.E. 300	Elements of Elec. Engineering	2	3/2	2	3/2
E.M. 350	Engineering Mechanics	3	0	3	0
Mech.E. 340	Thermodynamics I	2	3/2	2	3/2
	Total Hours—	16½	10½	19½	7½

FOURTH YEAR — CIVIL ENGINEERING

General, Structures, Highway, Soil Mechanics, Hydraulics and Municipal Patterns

Required Courses (All Patterns)

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 455	Materials of Construction	2	3	0	0
C.E. 440	Foundations & Earth Structures	2	0	2	0
C.E. 460	Theory of Structures	3	0	0	0
C.E. 463	Reinforced Conc. Design I(1)	2	3	0	0
C.E. 459	Prac. Experience of Project.	0	0	0	0
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
	Subtotal Hours—	9	6	3	0
	or—	7	3	5	3

Additional Courses:[2] General Pattern

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 410	Highway Engineering	2	0	2	3
C.E. 420	Water Supply & Sewerage	2	3	2	3
C.E. 434	Water Power Engineering	0	0	3	3
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
C.E. 464	Reinforced Conc. Design II	0	0	3	3
Group A	Non Tech. option, one course	3	0	3	0
	Subtotal Hours—	8	6	13	15
	Total Hours—	17	12	16	15

Additional Courses:[2] Structures Pattern

C.E. 410	Highway Engineering	2	0	2	3
C.E. 421	Water Supply and Sewerage	2	0	2	0
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
C.E. 464	Reinforced Conc. Design II	0	0	3	3
C.E. 466	Num. & Approx. Methods of Structural Analysis	0	0	2	0
E.M. 450	Strength of Materials	0	0	2	0
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2
	Subtotal Hours—	7	4½	13	10½
	Total Hours—	16	10½	16	10½

Additional Courses:[2] Highways Pattern

C.E. 410	Highway Engineering	2	0	2	3
C.E. 421	Water Supply & Sewerage	2	0	2	0
C.E. 425	Municipal Engineering	2	0	2	0
C.E. 433	Elements of River Engineering	0	0	3	0
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
Comm. Law 310	Commercial Law	3	0	3	0
Geol. 462	Photo Geology	1	3	0	0
	Subtotal Hours—	11	6	12	6
	Total Hours—	18	9	17	9

Additional Courses:[2] Soil Mechanics Pattern

C.E. 410	Highway Engineering	2	0	2	3
C.E. 421	Water Supply & Sewerage	2	0	2	0
C.E. 433	Elements of River Engineering	0	0	3	0
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
Geol. 459	Geomorphology & Glacial Geology	3	3	3	3
Geol. 462	Photo Geology	1	3	0	0
	Subtotal Hours—	9	9	10	9
	Total Hours—	16	12	15	12

Additional Courses:[2] Hydraulics Pattern

C.E. 411	Highway Engineering	2	0	2	0
C.E. 421	Water Supply & Sewerage	2	0	2	0
C.E. 430	Advanced Fluid Mechanics	3	0	3	0
C.E. 431	Senior Hydraulics Laboratory	0	3/2	0	3/2
C.E. 433	Elements of River Engineering	0	0	3	0
C.E. 434	Water Power Engineering	0	0	3	3
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
Geol. 462	Photo Geology	1	3	0	0
	Subtotal Hours—	9	7½	13	7½
	Total Hours—	16	10½	18	10½

Additional Courses:(2) Municipal Pattern

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 410	Highway Engineering	2	0	2	3
C.E. 420	Water Supply & Sewerage	2	3	2	3
C.E. 422	Sanitary Engineering Lab.	1	3	0	0
C.E. 425	Municipal Engineering	2	0	2	0
C.E. 433	Elements of River Engineering	0	0	3	0
C.E. 441	Soil Mechanics Laboratory	1	3	0	3
	Subtotal Hours—	8	9	9	9
	Total Hours—	15	12	14	12

(Optional Courses Applicable As Indicated Above)

Group A

A list of non-technical courses approved by the Department of Civil Engineering. The list is available at the time of registration at the Department office.

Group B

With the approval of the Head of the Department of Civil Engineering, one or more of the following courses may be substituted for certain of the courses listed in a pattern.

Chem. 371	Elementary Physical Chemistry	0	0	3	3/2
C.E. 422	Sanitary Engineering Lab.	1	3	0	0
C.E. 425	Municipal Engineering	2	0	2	0
C.E. 430	Advanced Fluid Mechanics	3	0	3	0
C.E. 431	Senior Hydraulics Lab.	0	3/2	0	3/2
C.E. 433	Elements of River Engineering	0	0	3	0
C.E. 434	Water Power Engineering	0	0	3	3
C.E. 441	Soil Mechanics Lab.	1	3	0	3
C.E. 464	Reinforced Conc. Design II	0	0	3	3
C.E. 466	Numerical & Approx. Methods of Structural Analysis	0	0	2	0
Comm. Law 310	Commercial Law	3	0	3	0
E.M. 450	Strength of Materials	0	0	2	0
E.M. 452	Mechanical Vibrations	3	0	0	0
Geol. 459	Geomorphology & Glacial Geology	3	3	3	3
Geol. 462	Photo Geology	1	3	0	0
Math. 458	Numerical Analysis & Modern Computational Methods	2	2	0	0
	or	0	0	2	2
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2

NOTES:—

(1) For those selecting patterns or optional courses leading to a heavier load in the first term this course is also offered in the second term.

(2) With the approval of the Head of the Department of Civil Engineering courses of equivalent weight from the Group B list may be substituted for certain of the courses listed for the pattern.

THIRD YEAR — ELECTRICAL ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 330	Fluid Mechanics	2	0	2	0
Econ. 302	Economics	3	0	3	0
E.E. 330	Electrical Machinery	2	3/2	2	3/2
E.E. 350	Electrical Circuits	2	3	2	3
E.E. 370	Engineering Electronics	2	3/2	2	3/2
Math. 404	Advanced Calculus	3	0	3	0
Mech.E. 340	Thermodynamics I	2	3/2	2	3/2
Phys. 430	Advanced Electricity & Mag.	3	3/2	3	3/2
	Total Hours—	19	9	19	9

FOURTH YEAR ELECTRICAL ENGINEERING

Power and Electronics Patterns

Required Courses (All Patterns)

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
E.E. 401	Electrical Design	0	3	0	0
E.E. 458	Electrical Laboratories	0	6	0	9
E.E. 460	Electrical Control	3	0	3	0
E.M. 452	Mechanical Vibrations	3	0	0	0
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
Phys. 530	Modern Physics	2	0	2	0
	Subtotal Hours—	8	9	6	9

Additional Courses: Power Pattern

E.E. 421	Electrical Power Transmission	3	0	0	0
E.E. 431	Advanced Electrical Machinery	3	0	0	0
Group A	Any three courses(1,2)	0	0	9	0
	Subtotal Hours(2)—	6	0	9	0
	Total Hours(2)—	14	9	15	9

Additional Courses: Electronics Pattern

E.E. 471	Electronic Circuits	3	0	0	0
E.E. 491	Transmission and Radiation	3	0	0	0
Group B	Any three courses(1,2)	0	0	9	0
	Subtotal Hours(2)—	6	0	9	0
	Total Hours(2)—	14	9	15	9

(Optional Courses Applicable As Indicated Above)

Group A

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
E.E. 407	High Voltage Engineering	0	0	3	0
E.E. 425	Power System Planning	0	0	3	0
E.E. 445	Elec. Instruments and Relays	0	0	3	0
Mech.E. 405	Power Plant Design	0	0	3	0
Math. 458	Numerical Analysis and Modern Computational Methods	0	0	2	2

Group B

E.E. 475	Gen. of High Frequencies	0	0	3	0
E.E. 477	Tube and Transistor Circuits	0	0	3	0
E.E. 485	Acoustics	0	0	3	0
E.E. 487	Communication Theory	0	0	3	0
Math. 458	Numerical Analysis and Modern Computational Methods	0	0	2	2

NOTES:—

(1) Selection to be approved by Head of Department of Electrical Engineering.

(2) Hours are approximate depending upon optional courses selected.

THIRD YEAR — MECHANICAL ENGINEERING

Required Courses

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 330, 331	Fluid Mechanics	2½	3/2	2½	3/2
Econ. 302	Principles of Economics	3	0	3	0
E.E. 300A	Elements of Elec. Engineering	3	3/2	3	3/2
Math. 404	Advanced Calculus	3	0	3	0
Mech.E. 340	Thermodynamics I	2	3/2	2	3/2
Mech.E. 360	Mechanics of Machines	2	0	2	0
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2
Group A	One course(1,2)	3	0	3	0
	Total Hours(1)—	20½	6	20½	6

(Optional Courses Applicable As Indicated Above)

Group A

C.E. 363	Elements of Structural Design	2	3	2	3
Math. 430	Advanced Mechanics	3	0	3	0

NOTES:—

(1) Hours are approximate depending upon optional courses selected.

(2) Selection to be approved by Head of Department of Mechanical Engineering.

FOURTH YEAR — MECHANICAL ENGINEERING

Required Courses

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 434	Water Power Engineering	3	3	0	0
E.M. 451	Advan. Strength of Materials	2	0	2	0
E.M. 452	Mechanical Vibrations	0	0	3	0
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
Mech.E. 405	Power Plant Design	3	0	0	0
Mech.E. 410	Production Engineering	0	0	2	3
Mech.E. 420	Combustion Engineering	2	3/2	2	3/2
Mech.E. 440	Thermodynamics II	2	3/2	2	3/2
Mech.E. 460	Machine Design	2	3	2	3
Mech.E. 470	Heat Transfer	2	3/2	2	3/2
Group A or B	Any one course(1,2)	3	0	3	0
	Total Hours(1)—	19	10½	19	10½

(Optional Courses Applicable As Indicated Above)

Group A

A list of non-technical courses approved by the Department of Mechanical Engineering. The list is available at the time of registration at the Department offices.

Group B

C.E. 430	Advanced Fluid Mechanics	3	0	3	0
Math. 500	Theory of Functions of a Complex Variable	3	0	3	0
C.E. 460(3)	Theory of Structures	3	0	0	0
Math. 458(3)	Numerical Analysis and Modern Computational Methods	0	0	2	2
E.E. 460 and lab.	Electrical Control and Servo-mechanisms	3	3/2	3	3/2
Math. 430	Advanced Mechanics	3	0	3	0

NOTES:—

(1) Hours are approximate depending upon optional courses selected.

(2) Selection to be approved by Head of Department of Mechanical Engineering.

(3) These courses must be elected together.

THIRD YEAR — METALLURGICAL ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 330 and 331A	Fluid Mechanics	2	0	2½	3/2
Chem. 470	Physical Chemistry	3	3/2	3	3/2
Econ. 302	Principles of Economics	3	0	3	0
E.E. 300	Elements of Elec. Engineering	2	3/2	2	3/2
Math. 404	Advanced Calculus	3	0	3	0
Mech.E. 340	Thermodynamics I	2	3/2	2	3/2
Met.E. 331	Ore Dressing	2	3/2	2	3/2
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2
	Total Hours—	19	7½	19½	9

FOURTH YEAR — METALLURGICAL ENGINEERING

Common Courses: Required in all Patterns

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Chem. 471	Electrochemistry	3	0	0	0
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
M.E. 300	Field Trips	0	0	0	0
M.E. 404	Practical Experience	0	0	0	0
Met.E. 464	Metallurgical Calculations	0	0	1	3
	Subtotal Hours—	3	0	2	3

Additional Courses: Physical Metallurgy Pattern

E.M. 451	Advan. Strength of Materials	2	0	2	0
Met.E. 436	Pyrometallurgy, Hydrometallurgy	3	3/2	3	3/2
Met.E. 462	Fundamentals of Physical Metallurgy	3	6	3	6
Met.E. 463	Applied Physical Metallurgy	3	6	3	3
Phys. 470	Molecular, Atomic and Nuclear Physics	3	0	3	0
	Subtotal Hours—	14	13½	14	10½
	Total Hours—	17	13½	16	13½

Additional Courses: Extractive Metallurgy Pattern

Chem. 350A	Organic Chemistry	3	0	3	0
Geol. 352	Mineralogy	3	3	3	3
Geol. 370	Ore Mineral Microscopy	0	3	0	0
M.E. 302	Principles of Mining	2	0	2	0
Met.E. 431	Flotation	3	3	0	3
Met.E. 433	Mill Design	0	0	0	3
Met.E. 435	Pyrometallurgy, Hydrometallurgy	3	3	3	3
Met.E. 465	Special Metallurgical Processes	0	0	2	0
	Subtotal Hours—	14	12	13	12
	Total Hours—	17	12	15	15

THIRD YEAR — MINING ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
C.E. 330 & 331A	Fluid Mechanics	2	0	2½	3/2
Econ. 302	Principles of Economics	3	0	3	0
E.E. 300	Elements of Elec. Engineering	2	3/2	2	3/2
Geol. 352	Mineralogy	3	3	3	3
Mech.E. 340	Thermodynamics I	2	3/2	2	3/2
M.E. 301	Principles of Mining	2	3/2	2	3/2
Met.E. 331	Ore Dressing	2	3/2	2	3/2
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2
	Total Hours—	18	10½	18½	12

FOURTH YEAR — MINING ENGINEERING
Metal Mining, Mining Geology, Coal Mining

Common Courses: Required in all Patterns

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
M.E. 300	Field Trip	0	0	0	0
M.E. 400	Mining Methods	3	0	3	0
M.E. 404	Practical Experience	0	0	0	0
Met.E. 436	Pyrometallurgy, Hydrometallurgy	3	3/2	3	3/2
	Subtotal Hours—	6	1½	7	1½

Additional Courses: Metal Mining Pattern

C.E. 362	Structural Design	2	3	2	3
Geol. 350	Petrology	0	3	0	0
Geol. 460	Mineral Deposits	0	0	3	3
M.E. 401, 403	Mine Design	0	6	0	6
Met.E. 432	Flotation	3	3	0	0
Met.E. 433	Mill Design	0	0	0	3
Group A		3	0	3	0
	Subtotal Hours—	8	15	8	15
	Total Hours—	14	16½	15	16½

Additional Courses: Mining Geology Pattern

Geol. 454	Petrology	3	3	3	3
Geol. 457	Structural Geology	3	0	3	3
Geol. 458	Economic Geology	3	3	3	3
M.E. 410A	Mine Design	0	3/2	0	3/2
M.E. 402	Mine Design	0	3/2	0	3/2
Met.E. 432	Flotation	3	3	0	0
	Subtotal Hours—	12	10½	9	10½
	Total Hours—	18	12	16	12

Additional Courses: Coal Mining Pattern(1)

C.E. 362	Structural Design	2	3	2	3
Geol. 356	Sedi. Petrol. & Stratigraphy	3	3	3	3
Geol. 461	Geol. of Pet., Nat. Gas & Coal	0	0	3	3
M.E. 401, 403	Mine Design	0	6	0	6
Met.E. 434	Coal Prep. and Plant Design	3	3	0	0
	Subtotal Hours—	8	15	8	15
	Total Hours—	14	16½	15	16½

(Optional Courses Applicable As Indicated Above)

Group A

A list of courses approved by the Department of Mining and Metallurgy. The list is available at the time of registration at the Department office.

NOTE:—

(1) This pattern offered only if a sufficient number of students register in it.

THIRD YEAR — PETROLEUM ENGINEERING

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Ch.E. 361	Unit Operations I	2	3/2	2	3/2
Chem. 473	Physical Chemistry	3	3/2	0	0
Econ. 302	Principles of Economics	3	0	3	0
E.E. 300	Elements of Elec. Engineering	2	3/2	2	3/2
Geol. 356	Sedimentary Petro. & Strati.	3	3	3	3
Math. 404	Advanced Calculus	3	0	3	0
Pet.E. 380	Properties of Petroleum	0	0	2	3/2
Pet.E. 381	Petroleum Prod. Engineering I	0	0	2	3/2
Pet.E. 382	Petroleum Res. Engineering I	2	3/2	0	0
	Total Hours—	18	9	17	9

FOURTH YEAR — PETROLEUM ENGINEERING

Required Courses

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Ch.E. 467	Thermodynamics	3	1	3	1
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
Pet.E. 481	Formation Eval. & Well Complet.	2	3/2	2	3/2
Pet.E. 482	Petrol. Reserv. Engineering II	3	3	2	3
Pet.E. 485	Natural Gas Engineering	3	3	0	0
Pet.E. 492	Colloquium	0	1	0	1
Pet.E. 473	Prac. Exper. & Summer Report	0	0	0	0
Pet.E. 474	Field Visits	0	0	0	0
Geol. 461	Geol. of Pet., Nat. Gas & Coal	0	0	3	3
Group A	Non-Technical Option	3	0	3	0
Group B	Two courses(1,2)	5	0	0	0
Group C	Two courses(1,2)	0	0	4	2
	Total Hours(2,—	19	9½	18	11½

(Optional Courses Applicable As Indicated Above)

Group A

A list of non-technical courses approved by the Department of Chemical and Petroleum Engineering. The list is available at the time of registration at the Department office.

Group B

Ch.E. 466	Introductory Instrumentation	3	0	0	0
Met.E. 503(3)	Corrosion	2	0	0	0
E.M. 451(3)	Advanced Strength of Materials	2	0	0	0
Math. 458	Numerical Analysis and Modern Computational Methods	2	2	0	0

Group C

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Pet.E. 486	Petrol. Prod. Economics	0	0	2	0
Pet.E. 487	Drilling and Prod. Prac.	0	0	2	3/2
Met.E. 503(3)	Corrosion	0	0	2	0
E.M. 451(3)	Advanced Strength of Materials	0	0	2	0
Math. 458	Numerical Analysis and Modern Computational Methods	0	0	2	2

NOTES:—

(1) Selection to be approved by Head of Department of Chemical and Petroleum Engineering.

(2) Hours are approximate depending upon optional courses selected.

(3) Continues through both terms.

ENGINEERING PHYSICS

Programs in Engineering Physics are provided in order to permit students who show special aptitude for mathematics and physics to obtain a more thorough grounding in these subjects. Graduates in Engineering Physics usually continue to post-graduate study in physics or in certain branches of engineering, or embark on careers in research and development in the many borderline fields where modern physics and engineering overlap. Students may elect to enter one of the following patterns: fluid mechanics, nuclear physics, electronics. A pattern once entered must be continued in the fourth year.

These programs are restricted to students who have completed the work of the first two years with averages of at least 75 percent (or with standings in the upper 10 percent of the class) and first class standing in mathematics and physics. Applications for admission to a program in Engineering Physics must be made to the Chairman of the Engineering Physics Committee before September 1st of the year in which the student is starting the third year.

For qualified students the details of the program are arranged by the Chairman of the Committee on Engineering Physics in consultation with the Head of the Engineering Department most closely associated with the proposed pattern and with the approval of the Dean.

THIRD YEAR — ENGINEERING PHYSICS
Fluid Mechanics, Nuclear Physics, Electronics

Common Courses: Required in all Patterns

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Math. 421	Differential Equations	2	0	2	0
Math. 422	Advanced Calculus	2	0	2	0
Group A	One Course	3	0	3	0
	Subtotal Hours—	7	0	7	0

Additional Courses: Fluid Mechanics Pattern[1]

C.E. 330	Fluid Mechanics	2	0	2	0
C.E. 460	Theory of Structures	0	0	3	0
E.M. 451	Advanced Strength of Materials	2	0	2	0
E.M. 452	Mechanical Vibrations	3	0	0	0
Math. 430	Advanced Mechanics	3	0	3	0
Phys. 480	Electromagnetism	3	3	3	3
	Subtotal Hours—	13	3	13	3
	Total Hours—	20	3	20	3

Additional Courses: Nuclear Physics Pattern[1]

Ch.E. 361	Unit Operations I	2	3/2	2	3/2
Math. 430	Advanced Mechanics	3	0	3	0
Phys. 470	Molecular Atomic and Nuclear Physics	3	0	3	0
Phys. 471	Advanced Laboratory	0	3	0	3
Group B	One course	3	0	3	0
	Subtotal Hours—	11	4½	11	4½
	Total Hours—	18	4½	18	4½

Additional Courses: Electronics Pattern[1]

E.E. 330	Electrical Machinery	2	3/2	2	3/2
E.E. 350	Electrical Circuits	2	3	2	3
E.E. 370	Engineering Electronics	2	3/2	2	3/2
Phys. 470	Molecular Atomic and Nuclear Physics	3	0	3	0
Phys. 480A	Electromagnetism	3	0	3	0
	Subtotal Hours—	12	6	12	6
	Total Hours—	19	6	19	6

(Optional Courses Applicable As Indicated Above)

Group A

German 110	Scientific German	3	0	3	0
German 310	Advanced Scientific German	3	0	3	0
Russian 110	Beginners Russian	3	0	3	0
Russian 310	Second Year Russian	3	0	3	0

Group B

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
E.E. 370	Engineering Electronics	2	3/2	2	3/2
Met.E. 361	Physical Metallurgy	2	3/2	2	3/2

NOTE:—

(1) With the approval of the Chairman of the Committee on Engineering Physics and the Dean suitable courses of equivalent weight may be substituted for certain of the courses listed for the pattern.

FOURTH YEAR — ENGINEERING PHYSICS
Fluid Mechanics, Nuclear Physics, Electronics

Common Courses: Required in all Patterns

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Eng.P. 459	The Practice of the Engineering Profession	0	0	1	0
Math. 500	Theory of Functions of a Complex Variable	3	0	3	0
Phys. 550	Mathematical Physics	2	1	2	1
	Subtotal Hours—	5	1	6	1

Additional Courses: Fluid Mechanics Pattern(1)

C.E. 430	Advanced Fluid Mechanics	3	0	3	0
C.E. 560	Advanced Structural Analysis	3	0	3	0
Math. 555	Hydro and Aeorodynamics	3	0	3	0
Phys. 510	Thermodynamics & Kinetic Theory	3	0	3	0
Group A	Two courses	3	0	3	0
	Subtotal Hours—	15	0	15	0
	Total Hours—	20	1	21	1

Additional Courses: Nuclear Physics Pattern(1)

Ch.E. 461	Unit Operations II	3	5	3	5
Ch.E. 467	Thermodynamics	3	1	3	1
Phys. 480A	Electromagnetism	3	0	3	0
Phys. 570	Quantum Mechanics	2	0	2	0
Phys. 572	Nuclear Physics	2	0	2	0
	Subtotal Hours—	13	6	13	6
	Total Hours—	18	7	19	7

Additional Courses: Electronics Pattern[1]

Number	Subject	Hours per week			
		First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
E.E. 460 and lab.	Electrical Control & Servo Mechanisms	3	2	3	3
E.E. 471 and lab.	Electronic Circuits	3	2	0	0
E.E. 491 and lab.	Transmission and Radiation	3	2	0	0
Phys. 510	Thermodynamics & Kinetic Theory	3	0	3	0
Group B	One Course	0	0	3	3
	Subtotal Hours—	9	0	9	0
	Total Hours[2]—	26	7	24	7

(Optional Courses Applicable As Indicated Above)

Group A

E.M. 551	Theory of Elasticity	3	0	0	0
E.M. 552	Dynamics of Structure	0	0	3	0
E.M. 553	Theory of Plates and Shells	0	0	3	0
E.M. 554	Theory of Elastic Stability	0	0	3	0

Group B

E.E. 445	Electrical Instruments & Relays	0	0	3	0
E.E. 477 and lab.	Special Tube & Transistor Circuits	0	0	3	3
E.E. 485 and lab.	Acoustics	0	0	3	3
E.E. 487	Communication Theory	0	0	3	0
E.E. 475 and lab.	Generation of high frequencies	0	0	3	3

NOTES:—

(1) With the approval of the Chairman of the Committee on Engineering Physics and the Dean suitable courses of equivalent weight may be substituted for certain of the courses listed for the pattern.

(2) Hours are approximate, depending on the optional courses selected.

DETAILS OF COURSES

Eng.P. 159. Orientation to the Engineering Profession (1-0; 0-0)

J. Longworth and Guest Speakers

An outline of the development and history of the engineering profession; the branches of engineering; the work of the engineer in the various branches.

Eng.P. 459. The Practice of the Engineering Profession (0-0; 1-0)

G. W. Govier and Guest Speakers

The role of the engineer in society, his technical and professional responsibilities—ethics of the profession; technical and professional associations; the engineer-in-training; the engineer in industry—technical and administrative work; the consulting engineer.

DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING

Chemical Engineering

Ch.E. 251. Engineering Materials (2-0; 2-0)

Department Staff

A study of the properties and behavior of engineering materials based upon modern theories of the structure of matter. Emphasis is placed upon the student acquiring an understanding of the relationship between solid state structure and the physical properties of materials. This relationship is illustrated by a detailed study of the more common materials such as ferrous and non-ferrous metals and their alloys, wood, concrete, refractories, rubber and plastics.

Textbook: Van Vlack, *Elements of Materials Science.*

Ch.E. 361. Unit Operations I (2-3/2; 2-3/2)

R. A. Ritter

The concept of the material and energy balances, fluid flow, including hydrostatics, flow of Newtonian fluids in circular pipes, measurement of flow, sedimentation and filtration. An introduction to heat transfer and to mass transfer. Design problem laboratories are conducted to illustrate the principles and to indicate the application to the process industries.

Textbooks: Brown, *Unit Operations;* Perry, *Chemical Engineers' Handbook.*

Corequisite: Chem. 470.

Ch.E. 365. Industrial Stoichiometry (2-1; 0-0)

A study in the application of the laws of conservation of mass and energy to the processes and operations of industrial chemistry. Extensive examples are introduced to illustrate units of measurement, material and energy balances without chemical reaction and material and energy balances in processes where chemical reaction is involved.

References: Henley and Bieber, *Chemical Engineering Calculations;* Williams and Johnson, *Stoichiometry for Chemical Engineers.*

Corequisites: Chem. 470, Ch.E. 361.

Ch.E. 461. Unit Operations II (3-5; 3-5)

D. Quon

The unit operations related to energy and mass transfer and the ideal stage concept including heat transfer, evaporation, crystallization, diffusion, ex-

traction, distillation, absorption, psychometry and drying. Design problems and experimental laboratories are conducted to illustrate the principles and to point out applications to the process industries.
Textbooks: Brown, *Unit Operations;* Perry, *Chemical Engineers' Handbook;* Treybal, *Mass Transfer Operations.*
Prerequisite: Ch.E. 361.
Corequisites: Math. 404, Ch.E. 467.

Ch.E. 464. Applied Reaction Kinetics (0-0; 2-1)
The interpretation of the kinetics of homogeneous and heterogeneous chemical reactions leading to the design of chemical reactor and related equipment. The principles are illustrated through the solution of practical problems.
Textbook: Smith, *Chemical Engineering Kinetics.*
References: Recent technical literature.
Coreequisites: Ch.E. 461 *and* Ch.E. 467.

Ch.E. 465. Chemical Process Industries (2-3/2; 3-3/2)
Topics will include chemical process economics and the technology of key chemical process industries including heavy chemicals, petrochemicals, and petroleum refining. Process development, plant location factors, water treatment, and steam and power generation are also considered. The various topics are unified through assignment to student groups of a chemical plant design project.
Textbooks: Osburn and Kammermeyer, *Money and the Chemical Engineer;* Shreve, *Chemical Process Indusrties.*
Prerequisite: Ch.E. 361, 365.
Corequisite: Ch.E. 461 and Ch.E. 467.

Ch.E. 466. Introductory Instrumentation and Control (3-0; 0-0)
R. A. Ritter
A study of the basic elements for measurement of process variables and their development to recording and control instruments; controller characteristics; control characteristics of industrial processes.
Textbook: Eckman, *Automatic Process Control.*

Ch.E. 467. Thermodynamics (3-1; 3-1)
D. B. Robinson
Thermodynamics presented from the engineering viewpoint. Practice is given in the application of thermodynamics as a useful tool in the solution of problems of the process industries and the petroleum production field.
Textbook: Weber and Meissner, *Thermodynamics for Chemical Engineers.*
Prerequisite: Chem. 470.
Corequisite: Math. 404.

Ch.E. 472. Colloquium
Department Staff
The colloquium, which meets once a week, is attended by fourth-year students and staff for discussion of topics from recent literature.

Ch.E. 473. Practical Experience and Summer Report
Students are required to find industrial employment and gain practical experience in the chemical or process industries or in petroleum exploration,

drilling, production or transportation for a period of at least one summer after completion of the second year and before entering the fourth year. Students who have encountered difficulty in finding suitable industrial employment are required to inform the Department not later than September 15 of the year preceding registration in the fourth year.

A suitable "Report on Practical Experience" must be prepared and submitted by every student on or before the last day of the first term. This is designated as the date of the final examination in this course.

Textbook: Kerekes and Winfrey, *Report Preparation,* 2nd Edition.

Ch.E. 474. Industrial Tour

The fourth-year class, accompanied by staff, inspect and study industrial plants, laboratories and field installations in and near Edmonton. Trips are arranged periodically throughout the year.

Graduate Courses—

Ch.E. 561. Physical Rate Processes (3-0; 0-0)

Advanced treatment of momentum, heat and mass transfer stressing the interrelationships between the three transfer processes. Topics will include compressible fluid flow, high velocity flow, corrective heat transfer. absorption and simultaneous heat and mass transfer processes such as drying and humidification.

References: Recent technical literature.

Ch.E. 562. Selected Topics in Unit Operations (0-0; 3-0)

Particular emphasis will be given to the equilibrium stage concept as applied to distillation and extraction. Certain other special topics such as two-dimensional heat flow, unsteady state heat flow, radiation, fluidization and packed beds may also be discussed.

References: Recent technical literature.

Ch.E. 565. High Pressure Technology (3-0; 0-0)

A study of the properties and behaviour of fluids at high pressure and of the underlying principles and the design of high pressure processing plant.

Textbook: Comings, *High Pressure Technology.*

(Not offered in 1960-61).

Ch.E. 566. Process Control (0-0; 1-3)

An experimental study of the basic characteristics of control elements and controlled processes.

Textbook: Eckman, *Automatic Process Control.*

References: Recent technical literature.

Ch.E. 567. Advanced Thermodynamics (0-0; 3-0)

Advanced applications of thermodynamics to industrial problems; the estimation of thermodynamic properties, feasibility of chemical reactions and other selected topics.

References: Recent technical literature.

Ch.E. 572. Graduate Seminar (1-0; 1-0)

ALL STAFF

A weekly meeting of all graduate students and staff for the discussion of progress and problems in research underway in the Department.

Ch.E. 577. Advanced Mathematical Applications (3-0; 0-0)

Mathematical applications to Chemical and Petroleum Engineering problems. Emphasis is placed on mathematical formulation of physical problems.

Petroleum Engineering

Pet.E. 380. Properties of Petroleum (0-0; 2-3/2)

A study of the physical and chemical properties of petroleum raw materials and products. Consideration is given to the role of properties in determining behaviour, economic values and processing methods.

Textbook: A.S.T.M. Standards on Petroleum Products.

References: Nelson, *Petroleum Refinery Engineering,* and recent technical literature.

Corequisite: Chem. 473.

Pet.E. 381 Petroleum Production Engineering I (0-0; 2-3/2)

Introduction to petroleum production engineering, including the role of oilfield waters, drilling fluids, and cements, formation testing and oil treating.

Texts: University of Texas, *Principles of Drilling Mud Control;* University of Texas, *Treating Oil Field Emulsions;* Uren, *Petroleum Production Engineering (Development),* 4th edition.

References: Recent technical literature.

Corequisites: Ch.E. 361, Pet.E. 380 and Chem. 473.

Pet.E. 382. Petroleum Reservoir Engineering 1 (2-3/2; 0-0)

D. L. FLOCK

An introduction to reservoir engineering with emphasis on the characteristics of petroleum reservoir fluids, the determination and estimation of these characteristics and their application in the study of petroleum reservoirs.

Textbooks: Burcik, *Properties of Petroleum Reservoir Fluids;* Natural Gas Supply Men's Association, *Engineering Data Book,* 1957 Edition.

Pet.E. 481. Petroleum Evaluation and Well Completions (2-3/2; 2-3/2)

R. T. HART

Coring and core analysis, formation testing, well logging and interpretation, formation evaluation techniques. Completion techniques, perforating, formation fracturing, permanent completions, multiple completions.

Textbook: Gatlin, *Petroleum Engineering: Drilling and Well Completion.*

Prerequisite: Pet.E. 381.

Pet.E. 482. Petroleum Reservoir Engineering (3-3; 2-3)

D. L. FLOCK

A study of the physical principles underlying petroleum reservoir engineering. Consideration is given to the application of these principles to the gathering of adequate reservoir data and to the analysis of petroleum reservoirs.

Textbooks: Calhoun, *Fundamentals of Reservoir Engineering;* Pirson, *Elements of Oil Reservoir Engineering.*

References: Recent technical literature.
Prerequisite: Pet.E. 381, 382.
Corequisites: Math. 404 and Pet.E. 481.

Pet.E. 485. Natural Gas Engineering (3-3; 0-0)

The properties of gas, dew points, gas hydrates, gas metering, reserves estimation, well gradients, steady state flow in the reservoir and well bore, well testing, pipeline transportation, elements of gas processing.
Textbooks: American Gas Association, *Orifice Metering of Natural Gas (Report No. 3)*; U.S. Bureau of Mines: Monograph 7; Railroad Commission of Texas, *Back Pressure Tests;* Natural Gasoline Supply Men's Association, *Engineering Data Book,* 1957 Edition.
Prerequisites: Pet.E. 380, 381, 382.
Corequisite: Ch.E. 467.

Pet.E. 486. Petroleum Production Economics (0-0; 2-0)

D. L. Flock

Factors that influence the value of oil and gas properties; cost data, appraisal of properties, profitability analyses, preparation of valuation reports, operating organization.
Textbook: Campbell, *Oil Property Evaluation.*
Corequisites: Pet.E. 481 and 482.

Pet.E. 487. Drilling Production Practices (2-3/2; 0-0)

Drilling techniques, penetration rate, air and turbo drilling, directional drilling, design of casting strings, cementing equipment, production techniques, mechanical pump and plunger systems, gas-lift.
Textbook: Gatlin, *Petroleum Engineering: Drilling and Well Completion.*
Corequisite: Pet.E. 481.

Pet.E. 492, 493, 494.

Course descriptions as for Ch.E. 472, 473, 474 respectively.

Graduate Courses—

Pet.E. 580. Advanced Physical Properties and Behavior of Petroleum Fluids (3-0; 0-0)

An advanced treatment of the phase behavior of pure hydrocarbon systems, binary systems, and multicomponent systems; including applications to predictions of the volumetric behavior of gas and crude oil systems, prediction of equilibrium composition of phases, the concept of convergence pressure, and the performance of condensate reservoirs.
References: Sage and Lacey, *Volumetric and Phase Behavior of Hydrocarbons;* Muskat, *Physical Principles of Oil Production;* Burcik, *Properties of Petroleum Reservoir Fluids.* Recent technical literature.

Pet.E. 582. Advanced Reservoir Engineering (3-0; 0-0)

D. L. Flock

Advanced studies in homogeneous and heterogeneous fluid flow in uniform and non-uniform strata.
Textbooks: Muskat, *Physical Principles of Oil Production;* recent technical literature.

Pet.E. 583. Advanced Topics in Petroleum Production Mechanisms (0-0; 3-0)

Advanced studies in gas-drive and water-drive reservoirs and selected topics.
Textbooks: as for Pet.E. 582.

Pet.E. 584. Secondary Recovery (0-0; 2-3/2)

A detailed study of certain secondary recovery phenomena; condensate reservoirs and other selected topics.
Textbook: A.P.I., *Secondary Recovery of Oil in the United States;* recent technical literature.

Pet.E. 585. Advanced Natural Gas Engineering (0-0; 2-0)

Laminar and turbulent flow in the reservoir, transient conditions, isochronal and other well testing procedures, processing principles, dehydration, desulphurization, liquid recovery, sulphur recovery, hydrocarbon utilization, deliverability problems, pipeline design.
Textbook: to be arranged.

Pet.E. 592.

Course description as for Ch.E. 572.

Research

Facilities are available for graduate research in fundamental problems in both chemical and petroleum engineering. Particulars may be obtained from the Department.

DEPARTMENT OF CIVIL ENGINEERING

C.E. 150. Surveying (2-0; 2-0)

P. Bouthillier, H. R. McArthur and Staff

The theory and practice of plane and topographic surveying, including construction, use and care of instruments; computation of areas; methods of topographic surveying; route surveys, including curve and earthwork problems; mine surveys; land-survey system.
Textbooks: Davis and Foote, *Surveying* (McGraw-Hill).

C.E. 151. Survey Field Work 3½ weeks at end of second term

Department Staff

Field work, including chaining, rodding, levelling, transit work, plotting of field notes.
Corequisite: C.E. 150.

C.E. 152. Surveying Daily for 2 weeks at end of second term

Department Staff

A condensed course in the theory and practice of plane surveying as applied to irrigation works, including construction, use and care of instruments; simple computations. Field work, including chaining, rodding, levelling, transit work, note-keeping and plotting of notes.
Available only to students from the Faculty of Agriculture who are registered for irrigation options.
Textbook: Davis and Foote, *Surveying* (McGraw-Hill).

C.E. 250. Astronomy and Mapping (2-3/; 2-3/2)

W. L. Bigg and E. W. Brooker

General conception of the universe; applied astronomy and geodesy; spherical trigonometry; solution of triangles for time, azimuth, latitude and longitude; basic concepts of navigation. General mapping, projections, photogrammetry.
Text: Hosmer-Robbins, *Astronomy* (Wiley).
Prerequisite: C.E. 150 and C.E. 151, Graphics 150.

C.E. 260. Strength of Materials (2-0; 2-0)

J. Longworth and Staff

Normal stress and normal strain; shearing stress and shearing strain; Mohr's circle for stress; temperature stresses; stresses in beams; beam deflections; statically indeterminate beams; torsion; combined stresses; columns.
Textbook: Olsen, *Elements of Mechanics of Materials* (Prentice Hall).
Prerequisites: Mathematics 202, E.M. 150.
Corequisite: C.E. 261.

C.E. 261. Strength of Materials Laboratory 1/2-3/2; 1/2-3/2)

G. Ford and Staff

Laboratory exercises to illustrate the physical properties of materials, including the testing of ordinary engineering materials in tension, compression, bending, twisting, hardness and impact.
Textbook: Morrison and Ford, *The Physical Properties of Solid Materials.*
Corequisite: C.E. 260.

C.E. 330. Fluid Mechanics (2-0; 2-0)

T. Blench and J. Verschuren

Fundamental principles of fluid mechanics.
Textbook: Streeter, *Fluid Mechanics* (McGraw-Hill).

C.E. 331. Hydraulic Laboratory (1/2-3/2; 1/2-3/2)

A. W. Peterson

Laboratory exercices in hydraulics, including experiments on small orifices, weirs and notches, flow through pipes, impact of jets, and tests of hydraulic machines, etc.
Corequisite: C.E. 330.

C.E. 332. Hydrology (2-3; 0-0)

T. Blench

The cycle of water occurrence in nature and its relation to hydraulic engineering. Frequency analysis, unitgraph methods, flood routing and other studies of hydrologic data.
References: *Hydrology Handbook,* A.S.C.E. Manual No. 128.

C.E. 338. Principles of Irrigation and Drainage (2-0; 2-0)

A. Peterson

Simple project problems on use of water; simple lateral and field distribution design; measurements of discharge; behaviour of simple weirs; preparation of discharge tables; principles of regime; modules; soil-water physics of waterlogging and alkali formation.

C.E. 340. Elements of Soil Mechanics (0-0; 2-0)

S. R. Sinclair and E. W. Brooker

Fundamental principles of soil mechanics including origin, classification and structure of soils; soil moisture, capillarity and permeability; simple soil tests and classification tests; subsurface investigations and strength theory.

Textbook: Taylor, *Fundamentals of Soil Mechanics* (Wiley).

C.E. 360. Theory of Structures (0-0; 3-0)

J. S. Kennedy

Statically determinate structures, their use in buildings and bridges; influence lines; stress analysis under static and moving loads, including a study of conventional loadings; deflections by analytical and graphical methods.

Textbook: Timoshenko and Young, *Theory of Structures,* (McGraw-Hill).

C.E. 362. Structural Design (2-3; 2-3)

J. Longworth and M. J. Baron

Codes and specifications. Theory and design of steel structures for riveted, bolted and welded fabrication; plate girders; trusses. Theory and design of timber structures including glued laminated members and timber connections. Design problems, including details and preparation of working drawings, are carried out in the laboratory.

Prerequisite: C.E. 260.

C.E. 363 Structural Design (2-3; 2-3)

J. Longworth

Theory and design of simple structures in steel, reinforced concrete and timber including connections, machine bases. Codes and specifications and their influence on design. Design problems are carried out in the laboratory.

Prerequisite: C.E. 260.

C.E. 410. Highway Engineering (2-0; 2-3)

K. O. Anderson and J. J. Bakker

Early roads, traffic planning, highway economics, geometric design; drainage, earthwork, compaction; soil stabilization, frost action, design of sub-base, base course and pavement both flexible and rigid; design of bituminous mixes and properties of bituminous materials.

Prerequisite: C.E. 340.

Corequisite: C.E. 440, C.E. 441.

Tetx: Hewes and Oglesby, *Highway Engineering* (Wiley).

C.E. 411. Highway Engineering (2-0; 2-0)

K. O. Anderson and J. J. Bakker

Early roads, traffic planning, highway economics, geometric design; drainage, earthwork, compaction; soil stabilization, frost action, design of sub-base, base course and pavement both flexible and rigid; design of bituminous mixes and properties of bituminous materials.

Prerequisite: C.E. 340.

Corequisite: C.E. 440, C.E. 441.

Text: Ritter and Paquette, *Highway Engineering* (Ronald).

C.E. 420. Water Supply and Sewerage (2-3; 2-3)

P. H. Bouthillier

Quantity, quality and pressure requirements; collection and intake works, water purification and treatment, design of water treatment plants, design and hydraulics of distribution systems. Separate and combined sewers, storm drains, pipe layout, estimates; methods of sewerage treatment and plant design.

Text: Steel, *Water Supply and Sewerage* (McGraw-Hill).

C.E. 421. Water Supply and Sewerage (2-0; 2-0)

P. H. Bouthillier

Lectures on quantity, quality and pressure requirements; collection and intake works, water purification and treatment, design of water treatment plants, design and hydraulics of distribution systems. Separate and combined sewers, storm drains, pipe layout, estimates; methods of sewerage treatment and plant design.

Text: Steel, *Water Supply and Sewerage* (McGraw-Hill).

C.E. 422. Sanitary Engineering Laboratory (1-3; 0-0)

P. H. Bouthillier

A laboratory course to include tests on water and sewerage, common control tests for water and sewage treatment, use of instruments and interpretation of results.

Text: *Standard Methods for the Examination of Water, Sewage and Industrial Wastes* (American Public Health Association).

C.E. 425. Municipal Engineering (2-0; 2-0)

J. J. Bakker and P. H. Bouthillier

Lectures covering fundamentals of topics related to municipal engineering including administration, economics, surveys, records, utilities, land use and subdivision design, street geometrics and traffic control, air pollution, and municipal master plan.

References: Selected from current technical literature.

C.E. 430. Advanced Fluid Mechanics (3-0; 3-0)

T. Blench

Hydrostatics. Potential fields and their flow lines. Flow nets. Vorticity. continuity equation. Differentiation with respect to time. Frictionless equations of motion and of energy. Physical aspect of energy equation and its practical extensions to friction, turbulence and mean velocity in a section. Rotating axes. Unsteady incompressible flow. Channel waves. Shock waves generally. Dimensional analysis. Friction factor in uniform pipes. Equation of motion with friction; stress representation; Navier-Stokes equation. Turbulence. Velocity distribution in uniform pipes and relation to flow formulas. Boundary layers.

Prerequisites: C.E. 330 and either E.M. 350 or Math. 404.

Text: Streeter, *Fluid Mechanics* (McGraw-Hill, 1958, Second Edition).

References: Prandtl, *Essentials of Fluid Dynamics* (Blackie, 1953); Lamb, *Hydrodynamics* (Dover Publications) 6th revised Edition; Milne-Thomson, *Theoretical Hydrodynamics* (Macmillan, 1955).

C.E. 431. Senior Hydraulics Laboratory (0-3/2; 0-3/2)

T. Blench and Staff

Choice from among a variety of experiments and related problems aimed mainly at demonstrating the behaviour of real fluids in engineering situations; model use and interpretation is included. Facilities are available for studying fundamental fluid behaviour.

C.E. 433. Elements of River Engineering (0-0; 3-0)

R. W. Ansley

Self-adjustment of sediment-bearing rivers; meanders, braids, cutoffs and chutes, degradation and aggradation, bed-material elutriation, bank deposition. Modes of sediment transport. Geometric treatment. Simple quantitative relations. Consequences of engineering interference with regime; reservoirs, dikes, cutoffs, discharge changes, course changes. Elements of training-work. Floods.

Text: T. Blench, *Regime Behaviour of Canals and Rivers* (Butterworths Scientific Publications. 1957).

Reference: Luna B. Leopold and Thomas Maddock Jr., *The Flood Control Controversy* (Ronald Press. 1954).

C.E. 434. Water Power Engineering (3-3; 0-0) or (0-0; 3-3)

R. W. Ansley

Use of water; principles of designing hydroelectric installations; principles of designing and testing of pumps and turbines; graphics of water hammer and surge; accessory equipment; economics; design and use of fans.

Reference: Addison, *A Treatise on Applied Hydraulics* (Chapman-Hall).

Prerequisite: C.E. 330.

C.E. 439. Irrigation Engineering (3-3; 0-0)

T. Blench

Lectures and laboratory covering regime theory, design principles of non-scouring flumes and falls, design of modules, sediment-transport, sediment exclusion and ejection, river behaviour and control, river models, water-logging and alkali formation.

Textbook: Blench, *Hydraulics of Sediment-Bearing Canals and Rivers.*

C.E. 440. Foundations and Earth Structures (2-0; 2-0)

S. R. Sinclair

Distribution of pressure under foundations, soil exploration methods and field tests, proportioning footings, pile foundations, landslides, earth pressures, theory of consolidation, earth dams, seepage.

Reference: Terzaghi and Peck, *Soil Mechanics in Engineering Practice* (Wiley).

Prerequisite: C.E. 340.

C.E. 441. Soil Mechanics Laboratory (1-3; 0-3)

S. R. Sinclair and E. W. Brooker

Laboratory testing to determine the engineering properties of soil; problems in the application of test results to the dsign of highways, airport runways, earth dams and building foundations.

Textbook: Lambe, *Soil Testing for Engineers,* (Wiley).

Prerequisite: C.E. 340.
Corequisite. C.E. 440, 410.

C.E. 455. Materials of Construction (2-3; 0-0)

A. PETERSON

Materials for concrete; proportioning of concrete mixtures; special treatments and uses of concrete; field methods in concrete practice. Study of materials, design of reinforcements, proportioning of mix, construction and testing of reinforced concrete beam. (The laboratory in the second half consists of group projects involving engineering materials.)

C.E. 459. Practical Experience or Project Assignment (no designated time)

Requirements for this course may be met one of three ways:—

(a) The student may find suitable employment and gain practical experience in Civil Engineering for a period of at least one summer vacation after completion of second year and before entering fourth year. A draft "Report on Practical Experience" must be prepared and submitted not later than December 1 of the fourth year. The final report must be submitted by February 1st.

or—

(b) Students finding difficulty in securing suitable employment are required to inform the Department not later than May 15 of the summer preceding registration in fourth year, at which time a library project may be assigned. A draft report on this work must be submitted not later than December 1 of the fourth year. The final report must be submitted by February 1st.

or—

(c) In certain special cases students of good academic standing may be permitted to carry out a research project in the fourth year under the direction of a staff member. The student will be required to submit a final report on the project not later than February 1st.

References: Kerekes and Winfrey, *Report Preparation Including Correspondence and Technical Writing* (Iowa State College Press, Ames, Iowa); Gaum, Graves, Hoffman, *Report Writing* (Prentice Hall).

C.E. 460. Theory of Structures (3-0; 0-0)

G. FORD

Statically indeterminate structures; analysis of frames and continuous girders and trusses, using method of work, moment distribution, column analogy, and concept of elastic weights. Analysis of bents for sidesway, lateral and portal bracing.

Textbook: Wang, *Statistically Indeterminate Structures* (McGraw-Hill).

C.E. 463. Reinforced Concrete Design I (2-3; 0-0) or (0-0; 2-3)

J. LONGWORTH

Codes and speifications and their influence on design. Elastic theory and design of continuous one-way slabs; beams and girders; tied columns and spirally reinforced columns; isolated column footings and combined footings, retaining walls.

Text: Urquhart and O'Rourke, *Design of Concrete Structures* (McGraw-Hill).

Prerequisite: C.E. 362.
Corequisite: C.E. 460.

C.E. 464. Reinforced Concrete Design II (0-0; 3-3)

J. Longworth

Floor systems for buildings and bridges including ribbed slabs, two-way slabs and flat slabs. Theory and design of rigid frames and arches. Ultimate design theory. Theory and design of prestressed concrete structures including principles of linear prestressing, design of simple beams.
Text: Urquhart and O'Rourke, *Design of Concrete Structures* (McGraw-Hill).
Prerequisite: C.E. 460, C.E. 463.

C.E. 466. Numerical and Approximate Methods of Structural Analysis (0-0; 2-0)

J. Longworth

Methods of successive approximations and numerical procedures for the solution of moments and deflections of beams and beam columns, influence lines, buckling strength of columns and vibrations of beams.

Graduate Courses—

C.E. 510. Pavement Design (2-2; 2-2)

K. O. Anderson

Theories, principles, and practices in the design, construction and control of flexible and rigid pavements for highways and airports. Source, manufacture, properties, tests and specifications of bituminous materials. Properties and testing of aggregates and bituminous mixtures. Current research developments.
Text: Yoder, *Principles of Pavement Design.*
References: A.S.T.M. Standards on Bituminous Construction Materials 1958. Recent technical literature.

C.E. 512. Transportation Engineering and Geometric Highway Design (3-0; 3-0)

J. J. Bakker

Introduction to all modes of trasportation. Physical,operational, economic and administrative fundamentals. Traffic engineering. Characteristics of vehicles, road users, traffic flow, speed, etc. Traffic control devices. Parking studies and design. Geometric design of highways, intersections and interchanges. Seminars on transportation, traffic and design problems.
References: Selected from technical literature.

C.E. 530. Advanced Fluid Mechanics (3-0; 3-0)

T. Blench

Hydrostatics. Potential fields and their flow lines. Flow nets. Vorticity. Continuity equation. Differentiation with respect to time. Frictionless equations of motion and of energy. Physical aspect of energy equation and its practical extensions to friction, turbulence and mean velocity in a section. Rotating axes. Unsteady analysis. Friction factor in uniform pipes. Equation of motion with friction; stress representation; Navier-Stokes equation. Turbulence. Velocity distribution in uniform pipes and relation to flow formulas. Boundary layers.

Prerequisites: C.E. 330 and either E.M. 350 or Math. 404.
Text: Streeter, *Fluid Mechanics* (McGraw-Hill, 1958, Second Edition).
References. Prandtl, *Essentials of Fluid Dynamics* (Blackie, 1953); Lamb, *Hydrodynamics* (Dover Publications) 6th revised Edition; Milne-Thomson, *Theoretical Hydrodynamics* (Macmillan, 1955).

C.E. 532. Advanced Hydrology (3-0; 3-0)

T. BLENCH

Detailed study, at an advanced level, of the major problems of field hydrology and the data and methods available for their solution.
Text: Linsley, Kohler and Paulhus, *Applied Hydrology* (McGraw-Hill, 1949).
Referencess: Todd, *Ground Water Hydrology* (Wiley, 1959); *Snow Hydrology,* U.S. Dept. of Commerce, Office of Technical Service.

C.E. 533. River Engineering (3-0; 3-0)

T. BLENCH

Fundamental treatment of the behaviour of rivers that adjust to suit their discharge and sediment-load patterns and the erodibility of their sides. Concept of regime. The laws of self-adjustment of canals of small bed-load charge. Laboratory data on efect of bed-load charge. Calculation related to canals of large bed-load charge. Dynamical discussion of the laws and their relation to rigid-boundary hydraulics. The law of meander adjustment. Rivers as canals with an added degree of freedom. Practical application of regime laws to river problems; erosion, training works, bridges, barrages, reservoirs, dikes, assisted cutoffs, diversions. Sediment measurement. Sediment exclusion and ejection. River models. Case histories.
Text: Blench, *Regime Behaviour of Canals and Rivers* (Butterworths, 1957)
References: Selected from technical literature.

C.E. 535. Open Channel Flow (3-0; 3-0)

J. P. VERSCHUREN

Euler's eqeuations, continuity equation; graphical and analytical solutions for the energy losses, conjugate depths and location of the hydraulic jump for rectangular and non-rectangular sections. Energy of flow, critical conditions and several methods of solving backwater curves for rectangular and non-rectangular sections. Wave celerity; relationship between wave celerity and rating curve and between celerity and average velocity. Oscillatory wave. Wave routing by analytical and graphical means, for friction, bedslope, and changes in cross-section of the canal. Surge waves.
References: Van Te Chow, *Open Channel Hydraulics* (McGraw-Hill, 1959)
Bakhmeteff, *Hydraulics of Open Channels* (McGraw-Hill, 1932)

C.E. 540. Theoretical Soil Mechanics (3-0; 3-0)

S. R. SINCLAIR

Theory of consolidation, stress deformation and strength characteristics, plastic equilibrium, stress distribution, seepage and electro-osmosis; and the application of these principles in engineering practice including the stability of foundations, settlements, stability of slopes and embankments, retaining walls, earth dams, highways and runways, and drainage; observation of behaviour of structures.

Text: Terzaghi, *Theoretical Soil Mechanics* (Wiley).
References: Selected from technical literature.

C.E. 541. Advanced Soil Mechanics Laboratory (0-6; 0-6)

S. R. SINCLAIR

Individual and group laboratory tests for the engineering properties of soils, including detailed methods of testing various soil types and a critical appraisal of the theoretical basis and significance of the common tests for soil classification, permeability, capillarity, moisture density relationships, consolidation, California bearing ratio, and strength-deformation tests including pore pressure measurements.
References: Selected from technical literature.

C.E. 542. Advanced Soil Mechanics Problems (3-0; 3-0)

R. M. HARDY

A case history method of approach to problems involving the application of the principles of soil mechanics in engineering practice, including the design and analysis of foundations, settlement, stability of slopes, earth dams and embankments, retaining walls, drainage and flow of water through soils.
References: Selected from technical literature.

C.E. 560. Advanced Structural Analysis (3-0; 3-0)

J. S. KENNEDY

A study of determinancy and stability criteria for pinned structures, frames, composite bodies and composite bodies on deformable support systems. Development of the classical methods of structural analysis using the principle of virtual work (a critical analysis of these methods to determine the similarities, differences and restrictions). Use of the method of work to determine deformation of statistically determinate pinned structures and frames. Application of the classical methods of analysis to statically indeterminate structures. Modern methods of analysis (slope-deflection, moment distribution and column analogy). The analysis of secondary stresses in trusses and the failure of trusses due to buckling of a particular member. Wind stress analysis for tall buildings. Introduction to plate theory and its application in structural analysis.
References: Selected from technical literature.

C.E. 561. Plastic Analysis and Design of Structures (0-0; 3-0)

J. LONGWORTH

Basic assumptions and hypotheses. Limit analysis of beams and frames. Determination of deflections in plastic beams and frames. Repeated loading and shakedown. Plastic analysis of members under combined stress.
Text: To be selected.

C.E. 562. Advanced Design in Structural Steel (3-0; 3-0)

J. LONGWORTH

The course consists of a critical examination of existing building codes covering design in structural steel in the light of theoretical analysis and experimental research. Some consideration is given to design in high strength steels and aluminum. Steel as a material of construction — a review of its properties. Tension members — net area and stress distribution. Con-

nections — riveted, welded, high tensile bolted. Compression members — buckling of columns, end conditions; local buckling; shear in columns. latticing; twist buckling. Flexural members — lateral buckling; design of crane girders; effects of holes; buckling of beam and girder webs, stiffener design; torsional instability. Combined bending and axial load. Beam to column connections — conventional, semi-rigid, rigid. Plastic design — flexure of beams, methods of analysis; frames, methods of analysis; influence of shearing force, axial load, local buckling, etc. on simple plastic design procedure.
References: Selected from technical literature.

C.E. 563. Advanced Design in Reinforced Concrete (3-0; 3-0)

R. N. McManus

Structural design and specifications. Reinforced concrete and prestressed concrete. Analysis of ultimate strength of reinforced concrete flexural and compression members with purpose of determining factors of safety in bending, shear, bond and direct compression. Current and historical literature and test data discussed. Prestressed concrete flexural members and specifications treated similarly.
References: Selected from technical literature.

Graphics

Graphics 150.

W. W. Preston and Staff

Basic engineering drawing and descriptive geometry. Lettering, use of instruments, pictorial sketching, detail and assembly drawings. Orthographic projection and revolution; problems involving points, lines and planes, surfaces and solids in space.
Text: Hoelscher and Springer, *Engineering Drawing and Geometry* (Wiley). Workbook: by same authors.

Graphics 250.

Continuation of Graphics 150 for students in the second year of Civil and Mechanical Engineering.
Freehand and instrumental drawing and detailing, illustrated by examples from Engineering practice.
Text: Hoelscher and Springer, *Engineering Drawing and Geometry* (Wiley); AISC Steel Handbook.
Prerequisite: Graphics 150.

DEPARTMENT OF ELECTRICAL ENGINEERING

E.E. 250. Principles of Circuitry (2-3/2; 2-3/2)

J. A. Harle and Staff

Current flow, Ohm's Law, series and parallel circuits, Kirchhoff's Laws, magnetic fluxes and changing fluxes, electric charges and changing charges, inductive resistive and capacitative circuits, generalised circuits, A.C. circuits, vector algebra, networks, network theories, transient conditions, topography.
Textbook: to be specified.

E.E. 300. Elements of Electrical Engineering (2-3/2; 2-3/2)

D. H. Kelly and Staff

The laws of electromagnetism; continuous and alternating currents in various

circuits; characteristics of direct and alternating current machinery, with a consideration of the class of work to which each machine is suited; the fundamental principles of power distribution. Introduction of electronic tubes and simple control circuits. The laboratory course includes the determination of the characteristics and efficiency of various machines; the use of measuring instruments, controlling and protecting apparatus.
Textbook: Gray and Wallace, *Principles and Practice of Electrical Engineering.*

E.E. 330. Electrical Machinery (2-3/2; 2-3/2)

R. E. PHILLIPS AND STAFF

A detailed study of power transformers, synchronous generators and motors, induction motors.
Textbook: to be announced.

E.E. 350. Electrical Circuits (2-3; 2-3)

J. A. HARLE AND STAFF

The magnetic circuit, 3-phase circuits, non-linear circuits, transmission lines with inductance, capacity, etc., transients, symmetrical components, topography, and instrumentation.
Textbook: to be announced.

E.E. 370. Engineering Electronics (2-3/2; 2-3/2)

J. W. PORTEOUS

Motion of charged particles in electric and magnetic fields; vacuum and semiconductor diode characteristics; photoelectric devices; vacuum triodes and equivalent circuits; transistors and equivalent circuits; multi-electrode tubes; gas tubes; untuned voltage and power amplifiers; amplitude modulation.
Textbook: Millman, *Vacuum-tube and semiconductor Electronics.*

E.E. 401. Electrical Design (0-3; 0-0)

R. W. KING

Electrical Design starting from fundamental physics using engineering methods.

E.E. 407. High Voltage Engineering (0-0; 3-0)

J. A. HARLE AND STAFF

High Voltage Phenomena on Transmission Lines, Dielectric Phenomena, A.C. Testing, Impulse Testing and Rating, Grounding, Circuit Breaking.

E.E. 421. Electrical Power Transmission (3-0; 0-0)

J. A. HARLE

Transmission Circuit Constants, G.M.D. Methods, AC Power Transmission and Power Diagrams, Line compensation, Fault Conditions with Asymmetry, DC Transmission.

E.E. 425. Power System Planning (0-0; 3-0)

J. A. HARLE AND STAFF

The Power system, Planning, continuity of supply, Operation, Economics, The system Analyser and its operation, Other methods of system analysis.

E.E. 431. Advanced Electrical Machinery (3-0; 0-0)

R. E. PHILLIPS AND STAFF

Electrical machinery: D.C. Machines, Power rectifying equipment, A.C. commutator machines and a more detailed study of selected topics from E.E. 330.

E.E. 445. Electrical Instruments and Relays (0-0; 3-0)

R. W. KING

A study of modern A.C. instruments, relays, and relaying.

E.E. 460. Electrical Control and Servomechanisms (3-0; 3-0)

Y. J. FOKKINGA

Introduction; Laplace transformations; obtaining system differential equations, transferfunctions. Elements of amplifiers (electronic, solid state, static, rotary), motors and actuators, transducers and their transferfunctions. The Analog computer. Stability, classification of systems, Routh criterion, Root-locus method, frequency response methods (Nyquist, Bode, Nichols), constant M and loci. Equalizers. Applications. Non linear systems.

Tentative textbook: Murphy, G. J., *Control Engineering* (van Nostrand).

Prerequisites: E.E. 350, E.E. 330, E.E. 370.

E.E. 471. Electronic Circuits (3-0; 0-0)

Voltage amplifiers; power amplifiers A.F. and R.F.; Class A, B and C; modulation and demodulation AM, FM and PM; Complete transmitter and receiver circuits.

Textbook: Millman, *Vacuum Tube and Semiconductor Electronics.*

E.E. 475. Generation of High Frequencies (0-0; 3-0)

Triodes at high frequencies; Klystrons; Travelling wave tubes; Magnetrons; Modulation.

Textbook: To be announced.

E.E. 477. Special Tube and Transistor Circuits (0-0; 3-0)

Special circuits such as pulse generating and shaping circuits; multivibrators; blocking, oscillators; applications to computers, etc.

Textbook: To be announced.

E.E. 485. Acoustics (0-0; 3-0)

General laws; impedance; transmission; transducers; enclosures; room acoustics, etc.

Textbook: To be announced.

E.E. 487. Communication Theory (0-0; 3-0)

This covers the principles of communication theory for students interested in communication and in the presentation of data to modern signalling systems. This is basically a new course.

E.E. 491. Transmission and Radiation (3-0; 0-0)

The telephone line; distortionless transmission; R.F. transmission line and matching circuits; R.F. line at very short wavelengths; Smith Chart; wave guides; atenna types and patterns; UHF radiators.

Textbook: To be announced.

Graduate Courses—

E.E. 521. Electric Circuits (2-6; 2-6)

J. A. Harle

The theory and methods for the analysis of modern power system problems with system studies on the Network Analyzer.

References: Dahl, *Electric Circuits;* Wagner and Evans, *Symmetrical Components;* Westinghouse Electrical Transmission and Distribution Reference Book; current journals.

E.E. 561. Principles of Servomechanisms (2-6; 2-6)

Y. J. Fokkinga

A study of the theory and design of servomechanisms.

Textbook: to be announced.

E.E. 591. Advanced Radio (2-6; 2-6)

J. W. Porteous

Advanced theory of radio with particular reference to field and wave theory, as applied to ultra high frequencies.

Latbortory will be in the nature of a thesis problem.

Textbook: To be announced.

Only two graduate courses will normally be available each year, and if required alternatives to above courses may be offered.

DEPARTMENT OF MECHANICAL ENGINEERING

E.M. 150. Engineering Mechanics (Statics) (3-0; 3-0)

J. S. Kennedy, H. R. McArthur and Staff

Fundamental principles of statistics and their applications; stresses in simple frames, friction; centres of gravity; moments of inertia.

Textbook: Meriam, *Mechanics, Part I: Statistics* (Wiley).

E.M. 250. Engineering Mechanics (Dynamics) (3-0; 3-0)

J. Duby and Staff

The fundamental principles of mechanics; kinematics; principles of kinetics; rectilinear translation; curvilinear translation; work and energy, impulse and momentum; periodic motion.

Textbook: Meriam, *Mechanics, Part II: Dynamics* (Wiley).

Prerequisite: Math. 202.

Corequisite: Math. 303.

E.M. 350. Enginering Applications of Differential Equations and Statistics (3-0; 3-0)

J. Duby

Review of basic engineering principles, ordinary differential equations, Laplace transforms, power and fourier series. Partial differential equations, statistics, introduction to complex variables and vector analysis. The above content is presented with numerous examples and applications to engineering problems in such a way as to show that differential equations and mathematical formulations are applicable in all fields.

Textbooks: Pipes, *Applied Mathematics for Engineers and Physicists* (McGraw-Hill); Pierce, *A Short Table of Integrals* (Ginn and Co.).

References: Reddick and Miller, *Advanced Mathematics for Engineers* (Wiley); Salvodari and Schwartz, *Differential Equations in Engineering Problems* (Prentice Hall).
Prerequisite: Math. 303.

E.M. 450. Advanced Strength of Materials (0-0; 2-0)

G. Ford

For Civil Engineering students only. Shear centers, unsymmetrical bending, curved flexural members, thick cylinders, shrink fits, thick rings, stability of columns, beams and plates, shells.
Reference: Seely and Smith, *Advanced Mechanics of Materials* (Wiley).

E.M. 451. Advanced Strength of Materials (2-0; 2-0)

G. Ford

For Mechanical Engineering students only. Shear centers, unsymmetrical bending, curved flexural members, thick cylinders, shrink fits, thick rings, theories of failure, elastic stability columns, beams, plates, torsion in bars of non-circular section, shells, contact stresses,
Textbook: Seely and Smith, *Advanced Mechanics of Materials* (Wiley).

E.M. 452. Mechanical Vibrations (0-0; 3-0) or (3-0; 0-0)

J. S. Kennedy

The behaviour of the lumped system of one and two degrees of freedom, together with discussion of vibration measuring instruments, vibration absorbers, vibration isolation, lumped systems of several degrees of freedom, vibration of beams, electrical equivalence of mchanical systems.
Textbook: Thompson, *Mechanical Vibrations* (Prentice Hall).
Prerequisites: E.M. 250, Math. 404.

Mech. E. 340. Thermodynamics I (2-3/2; 2-3/2)

D. Panar and Staff

First law of thermodynamics; Gas laws, properties of liquids, vapours and real gases; gas and vapour cycles; Reversible and irreversible changes; Second law of thermodynamics; Carnot cycle and entropy changes; Laboratory periods devoted to problems and tests demonstrating theory and practical applications.
Textbook: To be selected.

Mech.E. 360. Mechanics of Machines (2-0; 2-0)

E. W. Johnson

An introduction to the kinematics and dynamics of machines; theoretical design of clutches, brakes, belt drives, gears, shafting, etc.; balancing, critical speeds.
Textbook: Schigley, *Machine Design* (McGraw-Hill)
Reference: Schigley, *Kinematic Analysis of Mechanisms,* McGraw-Hill).

Mech.E. 405. Power Plant Design (0-0; 3-0) or (3-0; 0-0)

D. Panar

The economics, design and equipment of modern power stations and systems.
Textbook: Morse, *Power Plant Engineering.*
References: Gerhardt, *Steam Power Plant Engineering;* Skrotski and Vopat, *Applied Energy Conversion.*
Prerequisites: Mech.E. 340 and 341.

Mech.E. 410. Production Engineering (0-0; 2-3)

D. Panar and Staff

The study of basic machine tools used in production processes; economic layout, investigation and design of repetitive techniques; time-motion study and elementary cost analysis. Visits to manufacturing plants.
Textbook: *Boston Metal Processing* (Wiley).
Reference Text: *Barnes Motion and Time Study* (Wiley).

Mech.E. 420. Combustion Engineering (2-3/2; 2-3/2)

D. Panar

Application of laws of thermodynamics to combustion reactions, flame propagation, and fuel characteristics; elementary design principles of major engine components; laboratory demonstration of combustion principles.
Textbook: Lichty, *Internal Combustion Engines,* (McGraw-Hill).
Reference Text: Griswold, *Fuel Combustion and Furnaces,* McGraw-Hill).
Prerequisites: Mech.E. 340, Mech.E. 341.

Mech.E. 440. Thermodynamics II (2-3/2; 2-3/2)

J. Duby

Review of laws of thermodynamics and thermodynamic functions, irreversibility, Clausius inequality, availability, equilibrium, perfect gas, equations of state for non-ideal gases, hypothesis of corresponding states, introduction to kinetic theory, properties of pure substances, non-reactive gas mixtures and air conditioning, fission reactions, power cycles for gases, compression, expansion fluid flow and turbo machinery, propulsion, vapor power cycles and refrigeration.
Textbook: Soo, *Thermodynamics of Engineering Science* (Prentice Hall); Keenan and Keyes, *Thermodynamic Properties of Steam.*
Reference: Smith and Van Ness, *Introduction to Chemical Engineering Thermodynamics* (McGraw-Hill).

Mech.E. 460. Machine Design (2-3; 2-3)

Design of machine elements such as shafts, gears, bearings, and springs; application of theoretical results to practical cases involving the selection of suitable materials and dimensions. Detailed design of complete machines will be performed in the laboratory periods.
Textbook: Schigley, *Machine Design* (McGraw-Hill).
Prerequisite: Mech.E. 360.

Mech.E. 470 Heat Transfer (2-3/2; 2-3/2)

C. M. Rodkiewicz

Fundamental heat transfer principles: conduction; free and forced convection; radiation; combined effects of conduction, convention and radiation; design of heat transfer and condensation equipment; dimensional analysis.
Textbook: Jakob and Hawkins, *Elements of Heat Transfer* (Wiley).
Selected references.
Prerequisites: Mech.E. 340, Math. 404.

Graduate Courses—

E.M. 551. Theory of Elasticity (3-0; 0-0)

G. FORD

Fundamental concepts of elastic theory. Equation of stress equilibrium and strain compatibility. Solution of two dimensional problems. Analysis of stress and strain in three dimensions. Solution of torsion problems.
Textbook: Timoshenko and Goodier, *Theory of Elasticity*.
Selected references.

E.M. 552.* Dynamics of Structures (0-0; 3-0)

J. S. KENNEDY

Behaviour of elastic structures subjected to dynamic loads. Vibrations of buildings and bridges excited by machinery, earthquakes and wind traffic.
Textbook: Jacobsen and Ayre, *Engineering Vibrations*.
Selected references.

E.M. 553. Theory of Plates and Shells (0-0; 3-0)

J. S. KENNEDY

The plate equation in rectangular and polar coordinates. Solution of the plate equation for rectangular and circular plates under various loads. Special plate problems. Membrance theory of shells of revolution subjected to uniform and non-uniform loadings. Introduction to the binding theory of shells.
Textbook: Timoshenko and Woinowsky-Krieger, *Theory of Plates and Shells*.
Selected references.

E.M. 554. Theory of Elastic Stability (0-0; 3-0)

G. FORD

Stability analysis of bars under separate or combined axial, laterial, torsional loading, by solution of differential equations, energy approximations. Buckling of rectangular plates.
Textbook: Timoshenko, *Theory of Elastic Stability*.
Selected references.

E.M. 555.* Theory of Plasticity (3-0; 0-0)

Basic laws of stress and strain. Theories of strength. Plastic stress-strain relations. Problems in plastic flow of ideally platic materials. Problems in plastic flow of strain-hardening materials. Applications to metal forming processes.
Textbook: To be selected.

Mech.E. 520.* Advanced Combustion Engineering (2-3/2; 2-3/2)

D. PANAR

Detailed study of design problem of combustion engines. Thermodynamics and fluid mechanics applied to rotating machinery. Design of gas turbines and internal combustion components. Special tests on gas turbine and C.F.R. variable compression engine.
Textbook: To be selected.

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*To be offered starting 1961-62.

Mech.E. 525. Gas Dynamics (3-0; 3-0)

C. M. Rodkiewicz

Equations of motion in one dimension. Normal and oblique shock waves. Applications to channel flow. Wind tunnel operation and techniques. Two and three dimensional compressible fluid flow. Kinematics and dynamics of a fluid field. The small perturbation method. The hodograph methods. Numerical calculation methods. The method of characteristics. Flow in ducts with heating and cooling.

Textbook: Liepmann and Roshko, *Elements of Gas Dynamics.*

Selected references.

DEPARTMENT OF MINING AND METALLURGY

In Mining Engineering special sequences of courses may be taken in coal mining, metal mining or mining geology. In Metallurgical Engineering the option may be taken either in extractive metallurgy or physical metallurgy. First and second year courses are the same for Mining Engineering and Metallurgical Engineering. In Mining Engineering, third year is common to all options; in Metallurgical Engineering, third year is common to both extractive and physical metallurgy options. Course patterns in the fourth year are all different.

M.E. 300. Field Trips

An extended trip to visit mining areas will be made every second year by Third and Fourth Year Students accompanied by staff. Students will be required to pay for their food and lodging on field trips and a levy of not more than $50.00 will be made for transportation expenses. The next trip with the Third and Fourth Year Mining Class will be made in the Spring of 1961

Fourth Year Students with staff may also make about three part-day trips during the session to mining, metallurgical and other industrial plants near Edmonton.

Senior Courses—

M.E. 301. Principles of Mining (2-3/2; 2-3/2)

T. Patching

Elements of mining economics; field and geophysical prospecting; drilling; coal cutters; explosives and blasting; ground stresses, subsidence and support; development methods.

Laboratory work includes sampling exercises and calculations, and the design and preparation of working drawings for simple mine structures and layouts.

Textbook: Peele, *Mining Engineer's Handbook.*

References: Young, *Elements of Mining;* Lewis, *Elements of Mining.*

M.E. 302. Principles of Mining (2-0; 2-0)

T. Patching

(The same as M.E. 301 but for Extractive Metallurgy students)

M.E. 400. Mining Methods (3-0; 3-0)

T. PATCHING

Alluvial mining, open-cut mining, stoping and coal-mining methods; mine power, hoisting, haulage; ventilation; mine organization and management; valuation.

References: Beringer, *Underground Practice in Mining;* Weeks, *Ventilation of Mines;* Hoover, H., *Principles of Mining;* also Hoover, T. J., *Economics of Mining;* current periodicals and selected reading from other sources.

M.E. 401. Mine Design (0-3; 0-3)

T. PATCHING

Drafting-room work on the exploration, surface, and underground layout of a mine. Working groups of students are formed and to each group is submitted a problem involving the planning and design of a coal or metal mine. Detailed drawings and written discussion, with necessary specifications and costs, are required from each group.

References: Staley, *Mine Plant Design;* Tillson, *Mine Plant;* Easton, *Practical Mine Development and Equipment.*

M.E. 402. Mine Design (for Mining Geology students only) (0-3/2; 0-3/2)

T. PATCHING

For students in the mining geology option. The content is similar to that of M.E. 401, although the amount of detailed work required is reduced.

M.E. 403. Mine Design (0-3; 0-3)

T. PATCHING

Conference and drafting-room work on a mining problem.

M.E. 404. Practical Experience

Before being granted his degree, a student must satisfy the Department that he has had at least six months' practical experience in mining, metallurgy, geological field work, or such experience as shall be considered the equivalent of these. A suitable report on practical experience must be prepared and submitted to the Department not later than December 1 of the fourth year. Before starting to write the report, the student should consult the Department as to the suitability of the topic and the method of presentation.

Met.E. 331. Ore Dressing (2-3/2; 2-3/2)

E. O. LILGE

Lectures: Theory of crushing and grinding, theory of screening and classification, settling, filtering, specific gravity separation, amalgamation. Principles of operation of jig, tables, blankets and Dutch cyclone.

Laboratory: Exercises to demonstrate the principles of screening, gravity concentration, crushing and grinding, heavy media separation.

References: Taggart, *Handbook of Mineral Dressing;* Gaudin, *Principles of Mineral Dressing;* Taggart, *Elements of Ore Dressing.*

Met.E. 361. Physical Metallurgy (2-3/2; 2-3/2)

J. G. PARR

The physical metallurgy of the important metals and alloys. Structure of metals, deformation, annealing. Properties of solid solutions, eutectics and

eutectoids. Heat-treatment and properties of steels; influence of alloy additions. Stainless steels. Cast irons. Copper-base alloys; secondary solid solutions, intermediate phases. Light metal alloys; precipitation-hardening. Bearing metals. Welding metallurgy. Metallurgical aspects of corrosion.

Laboratory: The purpose of the laboratory course is to investigate the mechanical properties, metallographic structures and reactions to heat-treatment of some common metals and alloys.

Reference Books: Rollason, *Metallurgy for Engineers;* Heyer, *Engineering Physical Metallurgy;* Sisco, *Modern Metallurgy for Engineers;* Smith, *Principles of Physical Metallurgy;* Smith, *Alloy Series in Physical Metallurgy;* Greaves and Wrighton, *Practical Microscopical Metallography;* Kehl, *The Principles of Metallographic Laboratory Practice;* The Oxford Dictionary.

Prerequisite: Ch.E. 251 (C.P.E. 31).

Met.E. 431. Flotation (3-3; 0-3)

J. Leja

Elements of structural chemistry. Phases and interfaces. Types and properties of flotation reagents. Adsorption. Interactions at interfaces. Role of flotation collectors, frothers, activators and depressants. Kinetics of the process. Flotation machines and circuit. Flowsheets and milling calculations. Laboratory assignments: molecular models of flotation reagents, determinations of adsorption, surface tension, frothing; flotation tests on synthetic mixtures and ore samples.

References: Gaudin, *Flotation;* Sutherland & Wark, *Principles of Flotation.*

Met.E. 432. Flotation (For Metal Mining and Mining Geology Students) (3-3; 0-0)

J. Leja

(The same as Met. E. 431 except for reduced number of lab. assignments.)

Met.E. 433. Mill Design (0-0; 0-3)

E. O. Lilge

Interpretation of research and plant data for the purpose of flowsheet design. Material balance on unit and complete mill circuits. Calculations of capacity and size of machines. Detailed design of a small tonnage mill.

Reference: Taggart, *Handbook of Mineral Dressing.*

Met.E. 434. Coal Preparation and Plant Design (For Coal Mining Students only) (0-0; 3-3)

E. O. Lilge

Lectures: Coal washability curves, application of flotation and gravity concentration methods to coal cleaning, coal cleaning plants, classification and utilization of coal.

Laboratory: Flotation of coal, preparation of washability curves, flowsheets and coal-preparation plant design.

References: Taggart, *Handbook of Mineral Dressing;* Chapman and Mott, *The Cleaning of Coal;* Research Council of Alberta, Report 35, Coals of Alberta; Taggart, *Elements of Ore Dressing;* Wark, *Principles of Flotation.*

Met.E. 435. Pyrometallurgy and Hydrometallurgy (3-3; 3-3)

J. Leja, E. O. Lilge and J. G. Parr

Fire assaying. Principles of metallurgical operations. Pyrometallurgical methods of extraction. Refining of metals. Thermodynamics of metallurgical reactions. Methods of studying and controlling pyrometallurgical reactions. Phase rule and equilibrium diagrams. Metallurgical refractories and furnaces. Fuels. Details of conventional manufacturing procedures for iron and steel, copper, lead, zinc, aluminum.

Chemical thermodynamics of leach solutions, principles of leaching of metallic ores, including copper, zinc, nickel, cobalt and uranium.

Cyanidation of gold and silver ores. Ion exchange. Solvent extraction. Recovery of metals from leach solutions. Precipitation. Electrolysis (recovery and refining).

Laboratory: Slags, oxidation and reduction processes, gold and silver assay, lead smelting, matte smelting and converting to blister copper, sponge iron production, electrolytic deposition, atmospheric and pressure leaching, ion exchange, solvent extraction.

References: Bailey, *Textbook of Metallurgy;* Darken and Gurry, *Physical Chemistry of Metals;* Nachod, *Ion Exchange Technology;* Van Arsdale, *Hydrometallurgy of Base Metals;* Vol. VI and VIII, Proceedings of International Conference on Peaceful Uses of Atomic Energy, Geneva 1955; Steiner, *Introduction to Chemical Thermodynamics.*

Met.E. 436. Pyrometallurgy and Hydrometallurgy (3-3/2; 3-3/2)

J. Leja, E. O. Lilge and J. G. Parr

(for Mining Geology, Metal Mining and Physical Metallurgy students). (The same as Met. E. 435 except for reduced number of lab. assignments.)

Met.E. 462. Physical Metallurgy (3-6; 3-6)

J. G. Parr and W. V. Youdelis

Crystal symmetry—point group and space group symmetry, crystal lattices. Production and properties of x-rays; x-ray diffraction techniques; interpretation; applications. Theories of imperfections. Solidification of metals. Deformation of metals. Electron theory—electronic configuration; bonding; theories of alloy structure and formation. Zone theory; magnetic, electrical, thermal properties of metals; order-disorder transformations in metals—diffusion processes, martensitic processes. Simple thermodynamics of binary systems. Principles of ternary alloy systems.

Met.E. 463. Physical Metallurgy (3-6; 3-3)

J. G. Parr and W. V. Youdelis

Mechanical properties—effect of constitution of metals on the stress-strain curve, significance of true-stress: true-strain relationship, creep, theories of fracture. Advanced metallurgy of steel—heat-treatment, hardenability, brittleness; superalloys. Advanced metallurgy of the commercially important light metals—aluminum, magnesium, zirconium, titanium, with special reference to age-hardening processes. Fabrication processes. Failure of metals in service. Nuclear metallurgy.

Met.E. 464. Metallurgical Calculations (0-0; 1-3)

J. LEJA, W. V. YOUDELIS AND J. G. PARR

Combustion, material balance in smelting operations, calculation of smelting charges. Transfer of heat and heat balance. Standard free energy and entropy changes, heat of reaction; application to smelting, refining, volatilization and alloy formation. Production control and quality control. Reaction rates. Kinetic laws. Homogeneous, heterogeneous and electrochemical reactions.

Laboratory: problems covering all these aspects.

Reference: Butts, *Metallurgical Problems.*

Met.E. 465. Special Metallurgical Processes (0-0; 2-0)

J. LEJA, J. G. PARR AND W. V. YOUDELIS

New developments in iron and steel making processes. Non-melting reduction processes. Production of ferro alloy additives. Extraction processes for new metals; titanium, zirconium, columbium, hafnium, tantalum, uranium, thorium.

Graduate Courses:*

Met.E. 500. Metallurgical Thermodynamics (3-3; 0-0)

J. LEJA

Principles of thermodynamics, applications to pyrometallurgy, hydrometallurgy and corrosion. Effect of surfaces and interfaces. Techniques for evaluating thermodynamical data in metallurgical systems. Selected problems from metallurgical processes.

References: Guggenheim, *Thermodynamics.*

Met.E. 501. Kinetics of Metallurgical Processes (0-0; 3-3)

W. V. YOUDELIS

Lectures: Elementary Quantum Theory. Statistical treatment of reaction rates. Processes: homogeneous gas reactions, heterogeneous reactions, reactions in solutions, viscosity and diffusion, electro-chemical reactions, nucleation, recrystallization, grain growth. Theory of phase transformations.

Laboratory: Problems: Determinations of reaction rates; activation energies; electrochemical constants, nucleation, recrystallization and grain-growth rates. Application of the theory to actual metallurgical process—e.g. Open Hearth Steel Making.

Reference: Glasstone, Laidler and Eyring, *The Theory of Rate Processes.*

Met.E. 502. Advanced Crystallography (0-3; 0-0)

J. G. PARR

Advanced work in determination of crystal structures: single crystal techniques, application for Fourrier series; preferred orientation; electron diffraction. Advanced theory of imperfections.

Met.E. 503. Corrosion (2-0; 2-0)

STAFF

Electrochemical, overvoltage passivity, and reaction rate theories as applied to corrosion processes. Surface Chemistry of corrosion and inhibition. Studies

of selected corrosion processes: galvanic and concentration cell reactions, atmospheric and soil corrosion, effect of mechanical factors in corrosion. Practical aspects of corrosion processes.

Met.E. 504. Flotation (0-6; 0-6)

J. LEJA

Studies of selected problems in adsorption of flotation agents and kinetics of particle-bubble attachment.

Met.E. 505. Hydrometallurgy (0-6; 0-6)

E. O. LILGE AND J. LEJA

Physical chemistry of pressure leaching. Ionic processes in solution.

Met.E. 506. Research Techniques in Metallurgy (2-3; 0-0)

STAFF

Statistical analysis, electron microscopy and electron diffraction, crystal growth, diffused scattering of x-rays, electron emission, high speed strain measurements, internal friction, radioactive tracers and radiation damage. Zone refining, high pressure and vacuum processes, surface balance and adsorption.

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*NOTE: The Department reserves the right to offer only those graduate courses for which a sufficient number of students register.

COURSES OFFERED BY OTHER DEPARTMENTS

CHEMISTRY

232. Modern Chemistry (3-1S-3; 3-1S-3)

W. F. ALLEN, F. W. BIRSS AND L. H. CRAGG

Lectures: Stoichiometry, atomic and molecular structure; nuclear structure; thermodynamics, the inorganic chemistry of important elements; elementary physical chemistry; synthetic organic chemistry; and biochemistry.
Textbook: Stenko and Plane, *Chemistry*.
Laboratory: Experiments in general chemistry including some organic chemistry, quantitative chemistry and semi-micro qualitative analysis.
Prerequisite: Chemistry 130 or 30 of High School or equivalent.

311. Elementary Quantitative Analysis (2-3/2; 0-0)

Lectures: Principles and methods of quantitative analysis.
Laboratory: Gravimetric and volumetric procedures illustrating the principles of analysis.
Prerequisite: Chemistry 36, 40 or 232.

350. Organic Chemistry (3-3; 3-3)

R. K. BROWN AND R. J. CRAWFORD

Lectures: An introduction to a study of the compounds of carbon.
Laboratory: The preparation of some organic compounds.
Textbook: Boyd and Morrison, *Organic Chemistry*.
Laboratory Manual: Fieser, *Experiments in Organic Chemistry*, 3rd edition.
Prerequisite: Chemistry 35 or 36 or 40 or 230 or 232.

371. Elementary Physical Chemistry (0-0; 3-3/2)

P. KEBARLE

Lectures: Chemical Thermodynamics, chemical equilibria, changes of state, properties of solutions and phase equilibria.
Laboratory: Physico-chemical measurement applied to quantitative analysis.
Prerequisites: Chem. 232 and 311, Physics 238 and Mathematics 202.

451. Organic Chemistry (0-0; 3-3/2)

R. J. CRAWFORD

Theories of physical chemistry applied to organic reactions. The influence of structure on the mechanism of reaction.
Reference: Hine, *Physical-Organic Chemistry.*
Prerequisite: Chem. 350.

470. Physical Chemistry (3-3/2; 3-3/2)

P. KEBARLE

Lectures: Structure of atoms and molecules, crystals, and liquids; electrochemistry, chemical kinetics, photochemistry and radiation chemistry.
Laboratory: Physico-chemical measurements.
Prerequisites: Chem. 371, Math. 303.

471. Electrochemistry (2-0; 2-0)

R. N. O'BRIEN

Lectures: the theory of solutions; electrolysis; electrodes and electromotive force; galvanic cells; batteries; electroplating; electrometallurgy; industrial electrochemistry.
Textbook: Potter, *Electrochemistry.*
Prerequisite: Chem. 36 or 40 or 232.

473. Physical Chemistry (3-3/2; 0-0)

P. KEBARLE

Lectures: The first part of Chemistry 470 including structure of atoms and molecules, crystals and liquids.
Laboratory: Physico-chemical measurements.
Prerequisites: Chem. 371, Math. 303.

475. Advanced Physical Chemistry (3-3/2; 0-0)

G. R. FREEMAN

Chemical reaction kinetics, collision theory, chain reactions. Radiochemistry, artificial radioactivity, the use of isotopes. Radiation chemistry, effects of radiation on matter, radiation sources, chemical reactions induced by radiation.
References: Frost and Pearson, *Kinetics and Mechanism;* Friedlander and Kennedy, *Introduction to Radiochemistry.*
Prerequisites: Chem. 350 and 470.

ECONOMICS

302. Principles of Economics (3-0; 3-0)

M. BAUER

A survey of leading principles with special reference to engineering problems. Selected topics from corporation finance.

GEOLOGY

232. Introductory Geology (2-3/2; 2-3/2)

R. S. Taylor and H. A. K. Charlesworth

Physical geology and physiography; principles of mapping; interpretation of topographical maps; problems in geology; common rocks and rock-forming minerals; outline of historical geology.

Textbook: As prescribed by lecturer.

Senior Courses—

350. Petrology (Mining Engineering) (0-3; 0-0)

R. A. Burwash

Textbook: Pirsson (third edition, Knopf), *Rocks and Rock Minerals.*

Prerequisites: Geology 232 (32) and 352 (52).

352. Mineralogy (Mining Engineering) (3-3; 3-3)

F. A. Campbell

Principles of crystallography; physical and chemical properties of minerals.

Textbook: Dana, *Manual of Mineralogy* (16th ed.), revised by Hurlbut.

Prerequisite: Geology 232(32).

356. Sedimentary Petrology and Stratigraphy (Coal Mining and Petroleum Engineering) (3-3; 3-3)

S. J. Nelson

Introduction to sedimentary petrology, principles of sedimentation, stratigraphy and historical geology.

Textbook: *Geology and Economic Minerals of Canada,* 4th ed. (G.S.C.).

Reference: Krumbein and Sloss, *Stratigraphy and Sedimentation;* Pettijohn, *Sedimentary Rocks;* Dunbar and Rodgers, *Principles of Stratigraphy.*

Prerequisite: Geology 232(32).

454. Petrology (3-3; 3-3)

R. A. Burwash

Introduction to petrography; optical properties of common rock-forming minerals; classification and genesis of igneous, sedimentary and metamorphic rocks; examination of rock sections.

Textbooks: To be announced.

Prerequisite: Geology 352.

457. Structural Geology (3-0; 3-3)

H. A. K. Charlesworth

Introduction to structural geology; primary structures; mechanical principles involved in the deformation of rocks; description, mechanics and mapping of folds, faults, joints, and secondary foliation; mechanics of intrusion; regional structural geology of the earth's crust; structural interpretation of aerial photographs; problems.

Textbook: Billings, *Structural Geology.*

Prerequisites: Geology 1 and 51.

458. Mineral Deposits (3-3; 3-3)

R. E. Folinsbee

Classification, mode of occurrence and geological relations of various types of

mineral deposits, including petroleum, natural gas and coal.
Textbooks:Bateman, *Formation of Mineral Deposits;* Levorsen, *Geology of Petroleum.*
Prerequisite: Geology 51.

459. Geomorphology and Glacial Geology (3-3; 3-3)

R. S. TAYLOR

A study of land forms and the processes which create and modify them; a study of glacial features and their relation to physiographic development; map reading; field trips.
Textbooks: Thornbury, *Principles of Geomorphology;* Flint, *Glacial and Pleistocene Geology.*
Geomorphology may be taken as Geology 465 (3-3; 3-0); Glacial Geology may be taken as Geology 466 (0-0;3-3), with instructor's permission.

460. Mineral Deposits (Metal Mining) (0-0; 3-3)

R. E. FOLINSBEE

Classification, mode of occurrence and geological relations of various types of mineral deposits.
Textbook: Bateman, *Formation of Mineral Deposits.*
Prerequisite: Geology 352(52).

461. Geology of Petroleum, Natural Gas and Coal (Coal Mining and Petroleum Engineering) (0-0; 3-3)

J. F. LERBEKMO

Classification, mode of occurrence and geological characteristics of petroleum, natural gas and coal deposits.
Textbook: Levorsen, *Geology of Petroleum.*
Prerequisite: Geology 232(32).

462. Photogeology (1-3; 0-0)

R. S. TAYLOR

The application of aerial photographs to the preparation of planimetric and geological maps.
Textbook: Smith, *Aerial Photographs.*

MATHEMATICS

Junior and Senior Courses—

202. Elementary Mathematics (3-2; 3-2)

MEMBERS OF THE DEPARTMENT

Rate of change. Differentiation and integration of simple functions. Applications. Analytic geometry of the conic sections. Exponential, logarithmic and trigonometric functions.
Textbook: Angus Taylor, *Calculus with Analytic Geometry* (Prentice-Hall), Chapters 1-9.
Prerequisite: Mathematics 30 and 31 or high school.

303. Calculus and Analytical Geometry (3-2; 3-2)

STAFF

Polar coordinates. Methods and applications of integration. Series. Ele-

ments of partial differentiation. Multiple integration. Elements of differential equations.
Textbook: Angus Taylor, *Calculus with Analytic Geometry* (Prentice-Hall).
Prerequisite: Mathematics 202(2).

404. Advanced Calculus (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

Determinants. Ordinary differential equations. Series solutions of differential equations. Gamma, Bessel and Legendre Functions. Fourier series. Line and Surface Integrals. Complex numbers. Contour integration.
Textbook: Gaskell, *Engineering Mathematics* (Holt).
Prerequisite: Mathematics 303.

405. Advanced Calculus (3-0; 3-0)

Determinants. Ordinary differential equations. Series solutions of differential equations. Gamma, Bessel and Legendre Functions. Fourier series. Vector Aanalysis. Laplace Transforms.
(An alternative to 404, for third year Electrical Engineers).

406. Advanced Calculus (3-0; 3-0)

Determinants. Ordinary differential equations. Series solutions of differential equations. Gamma and Bessel Functions. Fourier series. Numerical methods. Boundary value problems.
(An alternative to 404, for third year Chemical and Petroleum Engineers).

421. Differential Equations (2-0; 2-0)

MEMBERS OF THE DEPARTMENT

Standard forms. The general linear equation. Laplace transforms. Systems of equations. Bessel and Legendre equations. Some partial differential equations. Fourier series.
Textbook: L. R. Ford, *Differential Equations* (McGraw-Hill).

422. Advanced Calculus (2-0; 2-0)

MEMBERS OF THE DEPARTMENT

Series. Uniform convergence. Functions of two or more variables. Vector analysis. Line and surface integrals. Multiple integrals.
Textbook: Courant, *Differential and Integral Calculus*. Vol. II (Blackie).

430. Advanced Mechanics (3-0; 3-0)

R. O. ROBINSON

Central orbits. Scattering theory. Harmonic oscillator. Normal modes of vibration. Space motion of a rigid body. Relative motion. Tops and gyroscopes. D'Alembert's principle. Generalized coordinates. Lagrange's equations. Hamilton's principle.
Textbook: Synge and Griffith, *Principles of Mechanics* (McGraw-Hill).
[For students in the third year of Engineering Physics.]

450. Probability and Statistics (3-0; 3-0)

E. S. KEEPING

Theory of probability. Distribution functions. Laws of large numbers. Sampling distributions. Confidence intervals. Statistical inference. Method of least squares. Analysis of variance.

Textbook: Kenney and Keeping, *Mathematics of Statistics* (Van Nostrand). Part II.
Prerequisite: Mathematics 303 (23).
(Some previous knowledge of elementary statistics is advisable.)

458. Numerical Analysis and Computation Methods (2-2; 0-0) or (0-0; 2-2)

J. McNamee

Introduction to linear algebra. Methods of solution for linear algebraic equations. Use of variational principles. Numerical methods for solving equilibrium problems and propagation (or rate) problems. The problems laboratory will make use of desk calculators as well as the facilities of the Computing Centre.
Textbook: Crandall, *Engineering Analysis* (McGraw-Hill).
Prerequisite: Mathematics 404 or equivalent.

500. Theory of Functions of a Complex Variable (3-0; 3-0)

L. Lorch

Complex numbers. Complex series. Functions of a complex variable. Cauchy's theorem and the calculus of residues. Integral functions. Conformal representation. The Laplace and Fourier transforms.
Textbook: Copson, *Functions of a Complex Variable* (Oxford Univ. Press).
(For students in the fourth year of Engineering Physics).

555. Hydro- and Aero-dynamics (3-0; 3-0)

J. R. Pounder

Classical hydrodynamics. Kutta-Joukowski theory of airfoils. Boundary layers. Flow of a viscous fluid. Supersonic flow. Shock waves.

PHYSICAL EDUCATION

All first-year students are required to register in Physical Education.

218. Recreational Activities (0-2; 0-2)

C. J. Drake and Staff

Emphasis on the fundamentals of the following recreational activities: Touch football, Borden ball, volleyball, badminton, basketball, tumbling, aquatics, and golf.
Course required of all first-year men.

228. Recreational Activities (0-2; 0-2)

R. Anderson and Staff

Emphasis on the fundamentals of the following recreational activities: Tennis, aquatics, badminton, volleyball, basketball, social dancing and golf.
Course required of all first-year women.

PHYSICS

238. Physical Properties of Matter, Heat, Wave Motion, Sound, and Light (3-2; 3-2)

Members of the Department

Illustrated by experiments.
Textbook: Sears and Zemansky, *University Physics, Part I.*

340. Light, Electricity and Magnetism (3-3/2; 3-3/2)

MEMBERS OF THE DEPARTMENT

A course resigned to follow Prysics 238 and to give a foundation in physics suitable for work in other physical sciences. Electrostatics, potential, capacitors, DC circuits, magnetism and magnetic field, electromagnetism, induced EMF, self-inductance, introduction to alternating currents. Physical optics, interference and diffraction, spectra, atoms and electrons.

Textbook: Sears and Zemansky, *University Physics, Part II.*

Prerequisite: Physics 238, Mathematics 202.

430. Advanced Electricity and Magnetism (3-3/2; 3-3/2)

F. WEICHMAN

Vector treatment of electric and magnetic fields, scalar and vector potentials, Maxwell's equations, electro-magnetic waves on homogeneous media, boundary conditions and reflection, standing waves. Electric and magnetic properties of solids, the electron band model, semi-conductors, role of impurities.

Textbooks: Skilling, *Fundamentals of Electric Waves,* 2nd Edition; Peck, *Electricity and Magnetism;* Martin, *Physical Basis of Electrical Engineering.*

Prerequisite: Physics 340 or 380, Mathematics 303 or 304.

470. Molecular, Atomic and Nuclear Physics (2-3/2; 2-3/2)

K. B. NEWBOUND

Electrons, photons and their interactions; restricted relativity theory; introductory wave mechanics; structure and spectra of atoms and molecules; X-rays and crystal structures; radioactivity and nuclear structure.

(For honors students and senior students in Arts and Science, and students in Engineering Physics.)

471. Advanced Laboratory (0-3; 0-3)

Methods in experimental atomic physics, spectroscopy and nuclear physics; introduction to modern laboratory techniques.

480. Electromagnetism (3-3; 3-3)

F. D. MANCHESTER

Description of electrostatic and electromagnetic fields using vector methods; potential theory; Maxwell's equations, electromagnetic waves and guided waves; electrical measurements; selected topics in electromagnetism.

Textbooks: Whitmer, *Electromagnetics;* Skilling, *Fundamentals of Electric Waves,* 2nd ed.; Peck, *Electricity and Magnetism.*

Reference Books: Slater and Frank, *Electromagnetism;* Bleaney and Bleaney, *Electricity and Magnetism;* Terry and Wahlin, *Advanced Laboratory Practice in Electricity and Magnetism;* Michels, *Advanced Electrical Measurements;* Ramo and Whinnery, *Fields and Waves in Modern Radio,* 2nd ed.

Prerequisite: Physics 340 or 380.

Prerequisite or corequisite: Mathematics 420(57).

510. Thermodynamics and Kinetic Theory (3-0; 3-0)

A. B. BHATIA

Principles of thermodynamics with physical applications, kinetic theory, transport phenomena, Boltzmann, Fermi-Dirac and Bose-Einstein statistics.

Textbooks: Zemansky, *Heat and Thermodynamics.*

Reference books: Jeans, *Kinetic Theory of Gases;* Kennard, *Kinetic Theory of Gases;* Loeb, *Kinetic Theory of Gases;* Ewing, *Thermodynamics for Engineers;* Burton, Smith and Wilhelm, *Phenomena at the Temperature of Liquid Helium;* Epstein, *Thermodynamics;* Bergmann, *Basic Theories of Physics.*
Prerequisites: Physics 340 or 380, Mathematics 303 or 304.

516. Solid State Physics (2-0; 2-0)

S. B. Woods

An introduction to the theory of solids, including a study of the properties of metals, semiconductors and dielectrics.
Textbook: Dekker, *Solid State Physics.*
References: Kittel, *Introduction to Solid State Physics;* Wannier, *Solid State Theory.*
Corequisite: Physics 470.

520. Geophysics (3-3; 3-3)

G. D. Garland

Physical structure of the earth and physical properties of the earth's crust, gravity, seismology, terrestrial magnetism, introduction to methods of geophysical exploration.
Prerequisites: Physics 340 or 380, Mathematics 303 or 304.
Corequisite: Mathematics 420.
Reference books: Jeffreys, *The Earth;* Bullen, *Theory of Seismology;* Nettleton, *Geophysical Prospecting for Oil;* Eve and Keys, *Applied Geophysics,* 4th edition.

530. Modern Physics for Engineers (2-0; 2-0)

Review of atomic structure, introduction to quantum theory, crystal structure and properties of crystals, radioactivity, nuclear reactions and nuclear structure, special relativity, introduction to problems of nuclear energy.
Textbook: Sproull, *Modern Physics for Engineers.*
Prerequisites: Physics 430, Mathematics 404, or equivalents.

550. Mathematical Physics (2-1s; 2-1s)

D. D. Betts

This course is intended as an introduction to the principal mathematical methods of dealing with the scalar and vector fields of physics. Topics include the Sturm-Liouville theory of eigenvalue problems, matrices, partial differential equations, operational methods and Laplace transforms, Fourier transforms, Green's functions, integral equations and the non-linear equations of hydrodynamics. One hour per week will be spent on class discussion of problems.
Reference books: Margenau and Murphy, *Mathematics of Physics and Chemistry;* Page, *Physical Mathematics;* Morse and Feshbach, *Methods of Theoretical Physics;* Band, *Introduction to Mathematical Physics.*
Prerequisite: Mathematics 420 or equivalent.

570. Quantum Mechanics (2-0; 2-0)

L. E. H. Trainor

Introduction to the basic principles of quantum mechanics with application to problems in modern physics.

Reference books: Sherwin, *Introduction to Quantum Mechanics;* Landau and Lifshitz, *Quantum Mechanics;* Leighton, *Principles of Modern Physics.*
Prerequisite: Physics 470, Mathematics 420 and 430.
Prerequisite or corequisite: Physics 480.

572. Nuclear Physics (2-0; 2-0)

W. K. DAWSON

Introductory survey of modern experimental and theoretical nuclear physics.
Reference books: Green, *Nuclear Physics;* Evans, *The Atomic Nucleus;* Leighton, *Principles of Modern Physics.*
Corequisite: Physics 570.

XIII

The School of Household Economics

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

Degree courses in Household Economics have been offered at the University of Alberta since 1918, when a department of Household Economics was established. In 1928 the School of Household Economics was organized under the Faculty of Arts and Science.

The course of study is a general one, designed to provide the student with a foundation in Arts, Science, and Household Economics which will enable her to enter any of the numerous branches of Home Economics, or to proceed to graduate study. For some of these lines of work, special training is required. For example, if a graduate plans to teach, she must obtain a Teacher's Certificate, and if she plans to be a dietitian she must qualify by taking student training in a hospital or commercial institution. Other positions open to graduates in Household Economics are as directors of the home service departments of utility companies; home economists in food industries and extension work; radio and television; nutritionists in social services, industrial plants, government departments and in nursery schools; laboratory technicians; and editorial positions in the field of journalism. For some of these positions, special training and experience are desirable, but the present great demand has necessitated the employment of some graduates without this advanced training.

(2) ADMISSION

For the degree of B.Sc. in H.Ec.:

(a) a High School diploma with

(b) "B" or higher standing in

1. English 30,
2. Social Studies 30,
3. Mathematics 30,
4. French 30 or German 30 or Latin 30,
5. Chemistry 30, and
6. Physics 30 or Biology 32 (Preferably Physics)

(c) an average in these six courses of at least 60%.

Students of the first year are invited to consult the Director with respect to the choice of courses for the senior years so that their programs may form coherent groups of studies in harmony with their main intellectual interests.

(3) PROMOTION

1. Of the courses taken for the B.Sc. degree in Household Economics, students must obtain second-class standing, that is a mark of 65%, in no fewer than six courses, of which at least *four* are taken in the second and third years..
2. The following combination is counted as a course in the application of these regulations: Household Economics 456(56), 457(58) and 459(59).

3. The promotion of a student from the first to the second year is contingent on the satisfactory completion in one year of a first-year program of normal weight. This regulation applies also to students from other universities.

(4) PROGRAM OF STUDY FOR THE B.Sc. DEGREE IN HOUSEHOLD ECONOMICS

First Year

English 210 or French 200 or German 200 or Latin 200; Chemistry 230; Chemistry 250; Zoology 220; Household Economics 202; Physical Education.

Second Year

Economics 200; Physiology 360; Biochemistry 300; Household Economics 304; Bacteriology 201, first term; Household Economics 303, second term.

Third Year

One course from Division A or B; Household Economics 451, 454, 456, 457, 458, 459; an approved option.

Students interested in clothing and design and not planning to go into Institution work may elect Household Economics 460 instead of Household Economics 451, 454 and 457.

(5) GRADUATE STUDIES

Students wishing to pursue graduate work towards the Master's degree should consult the Calendar of the Faculty of Graduate Studies.

Students interested in Education and Household Economics should consult the Calendar of the Faculty of Education.

(6) DETAILS OF COURSES

The University reserves the right to modify or withdraw for the session any of the courses here outlined.

Students are reminded of the regulations regarding attendance requirements (see page 32 of the Calendar).

NOTE: In the case of courses in which the weekly hours of instruction are fixed, these are set out for both terms of the winter session. The first figure in each term indicates lecture-hours and the second laboratory-hours.

BACTERIOLOGY

201. (1.) Elementary Bacteriology (2-3; 0-0)

MEMBERS OF THE DEPARTMENT OF BACTERIOLOGY

Simple general bacteriology; the importance of bacteria in everyday life. Demonstrations and practical laboratory exercises.

BIOCHEMISTRY

300. (50.) General Course (3-3; 3-3)

MEMBERS OF THE DEPARTMENT OF BIOCHEMISTRY

Open to students in Household Economics with the prerequisites Chemistry 230(35) and 250(39).

The topics dealt with include: physico-chemical properties of protoplasm; chemistry of carbohydrates, lipids proteins; enzymes; the physiological chemistry of digestion, respiration, excretion; intermediary metabolism, hormones, and nutrition.
Text: Harrow and Mazur, *Textbook of Biochemistry.*

CHEMISTRY

130. (1.) Introductory General Chemistry (3-3; 3-3)

Members of the Department of Chemistry

Lectures: An elementary introduction to chemistry illustrated by the chemistry of metals, non-metals and carbon compounds.
Laboratory: Experiments related to the lecture material.
(Offered at Summer School only.)

230. (35.) Inorganic Chemistry (4-3; 4-3)

S. G. Davis, G. R. Freeman, R. N. O'Brien and W. J. Wallace

Lectures: the fundamental concepts of chemistry as applied to the elements and their compounds.
Laboratory: The preparation of compounds, quantitative chemistry and semi-micro qualitative analysis.
Textbook: Sisler, Vander Werf, and Davidson, *General Chemistry.*
Prerequisite: Chemistry 130(1) or Chem. 30 of High School or equivalent.

250. (39.) Organic Chemistry (3-3; 3-3)

R. B. Sandin and W. A. Ayer

Lectures: An introduction to a study of the compounds of carbon.
Laboratory: The preparation of some organic compounds.
Textbook: Fieser and Fieser, *Organic Chemistry,* or Noller, *Textbook of Organic Chemistry.*
Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd ed.
Prerequisite: Chemistry 130(1) or Chem. 30 of High School or equivalent.

ECONOMICS

200. (1.) Principles of Economics (3-0; 3-0)

Members of the Department of Political Economy

A general introduction to the study of the tendencies underlying the wealthgetting and wealth-using activities of man.
(Prerequisite for all Economics courses except 310, 311 and 330).

ENGLISH

210. (5S) English Language and Literature (3-0; 3-0)

Members of the Department of English

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.
Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rinehart); Shaw, *St. Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heine-

mann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

HOUSEHOLD ECONOMICS

STAFF:—

Professor and Director of the School—Elizabeth L. Empey
Associate Professor—Grace L. Duggan (on leave of absence)
Assistant Professors—Margaret Campion, Helen Moseson, Ruth Renner
Lecturers—Melvina M. Gowda. Zenovia Lukianchuk, Frances M. T. Zintel
Instructors—Grace E. Cairns (Dietitian, University Cafeteria), Lila Mann (Dietitian, University Residences), Natalie Skrepneck (Assistant Dietitian, University Residences)

202. (2. and 12.) Textiles and Clothing (3-3; 3-3)

F. M. T. ZINTEL

A study of the composition, manufacture and properties of fabrics, their use and care. The selection of clothing in relation to the individual. The use of commercial patterns in garment construction. Fitting. Sewing techniques as they apply to specific fabrics and to various types of garments.

Textbooks: Hollen and Sadler, *Textiles;* Erwin, *Clothing for Moderns.*

‡210. (11. and 51.) Foods and Nutrition (3-3; 3-3)

M. CAMPION

An elementary study of the composition and nutritive value of foods, with laboratory practice in food preparation, meal planning and service.

Textbooks: Hughes, *Introductory Foods;* Bogert, *Nutrition and Physical Fitness.*

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‡For students in Education and Arts and Science.

303. (3.) Household Management (0-0; 3-3)

M. CAMPION

Materials found in the home; principles involved in their care; the house, its equipment and furnishings; labor-saving devices.

Textbook: Peet and Thye, *Household Equipment.*

304. (53.) Foods (3-5; 3-5)

The theory and practice of food preparation; meal planning and table service.

Textbook: Fitch and Frances, *Foods and Principles of Cookery.*

Prerequisite: Chemistry 250(39).

350. (45.) Applied Art (3-3; 3-3)

A study of the principles of design and the theory of color. Creative problems including block printing, stencilling, stitchery, and other techniques. Historic styles of architecture and furniture and their relation to modern design. The planning of a contemporary house and its furnishings.

Textbook: Goldstein, H. and Goldstein, V., *Art in Everyday Life.*

405. (62A.) Nutrition for Public Health Nurses (1-0; 0-0)

E. Empey

For students in the School of Nursing. A study of the application of nutrition as it relates to Public Health.
Textbook: Hiltz, *Nutrition.*

†450. (44.) Nutrition and Economics of the Household (3-3; 3-3)

E. Empey

The principles of nutrition applied to the feeding of the family. The history of family life; family relationships; standards of living; household production; the income and its expenditure; budgets; consumer education.
Textbooks: McHenry, *Basic Nutrition;* Bigelow, *Family Finance.*
Prerequisite: H.Ec. 210(11 and 51) and Chem. 250(35) or Chem. 350(39).

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†For Education students only.

451. (64.) Institutional Management (0-0; 2-3)

M. Gowda, E. Cairns, L. Mann and Others

The organization and administration of food services in institutions. This will include some observation and practice in various food services.
Textbook: West and Wood, *Food Service in Institutions.*

454. (54.) Experimental Cookery (0-3; 0-3)

Textbook: Lowe, *Experimental Cookery.*
Prerequisite: H.Ec. 304(53).

456. (56.) Economics of the Household (2-0; 2-0)

E. Empey

The history of family life, family relationships, homemaking, standards of living; household production, the income and its expenditure, budgets, consumer education.
Textbook: Bigelow, *Family Finance.*
Prerequisite: Economics 200(1).

457. (58.) Food and Diet for the Sick (0-0; 1-3)

M. Gowda

Textbook: Proudfoot, *Nutrition and Diet Therapy.*
Co-requisite: H.Ec. 458(57).

458. (57.) Nutrition (3-3; 3-3)

E. Empey

The principles of nutrition applied to the feeding of individuals and the family group under normal conditions. Diets for special cases.
Textbooks: Sherman, *Chemistry of Food and Nutrition;* Table of Food Values.
Prerequisite: H.Ec. 304(53) and Biochemistry 300(50).

459. (59.) Methods of Presentation (3-3; 0-0)

M. Gowda

A course in methods of presentation of subject matter in household

economics; practical experience in demonstrations and other forms of communication.
Prerequisite: H.Ec. 304(53).

460. (46.) Advanced Clothing (3-3; 3-3)

The study of historic and contemporary costume design. The development of the foundation pattern. Flat pattern designing, draping and tailoring for selected garments and construction in appropriate fabrics.
Prerequisite: H.Ec. 202(2 and 12) and H.Ec. 350(45).
Textbook: Mansfield, E., *Clothing Construction.*

PHYSICAL EDUCATION

MEMBERS OF THE PHYSICAL EDUCATION STAFF

All first-year students are required to register in Physical Education.

Phys. E. 228 (2W) Recreational Activities (0-2; 0-2)

R. ANDERSON AND STAFF

Emphasis on the fundamentals of the following recreational activities: tennis, aquatics, badminton, volleyball, basketball, social dancing and golf. Course required of all first-year women.

PHYSIOLOGY

MEMBERS OF THE DEPARTMENT OF PHYSIOLOGY

360. (60.) Elementary Human Physiology (3-0; 3-0)

This course comprises a study of the essentials of human physiology. For students of Household Economics.
Prerequisites: Zoology 220(1) and Chemistry 350(42) or Chemistry 250(39).
Textbooks: Guyton, *Function of the Human Body;* Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed. The latter is recommended as a reference text.

ZOOLOGY

MEMBERS OF THE DEPARTMENT OF ZOOLOGY

Junior Courses—

220. (1.) Elementary Zoology (3-3; 3-3)

Animal organization; comparative morphology; essentials of histology; principal phenomena of distribution, behavior, ecology, development and reproduction; evolution, variation and heredity.

XIV

The Faculty of Law

INFORMATION, REGULATIONS, COURSES

INTRODUCTION

The course offered by the Faculty of Law is designed to qualify a student for the practice of law in any jurisdiction in which the Common Law prevails. It is also designed to offer training for business and government administration.

Completion of the course in the Faculty of Law at this University leads to the degree of Bachelor of Laws. The course requires a student's full time attendance for three academic years.

A graduate of the Faculty of Law who wishes to enter upon the practice of law must meet the requirements of the jurisdiction in which he desires to practise. The Province of Alberta requires the resident student graduate to article with a practising member of the Bar and serve under him for one year; at the end of this period and upon fulfilling certain other conditions he is formally admitted by a judge of the Supreme Court to the practice of Law in this province.

ADMISSION REQUIREMENTS

The entrance requirement of the Faculty of Law is:

(a) Either the degree of B.A. or the equivalent as accepted by the Committee on Admissions, or

(b) the completion of two years of the combined B.A., LL.B., course as offered by the University.

The matriculation requirements for the combined course are the same as for the B.A. program, namely:

(a) a High School Diploma with

(b) "B" or higher standing in English 30, Social Studies 30, Mathematics 30, French 30 or German 30 or Latin 30 and two of Chemistry 30, Physics 30, Biology 32, a second Grade XII language; and

(c) an average in these six courses of at least 60%.

Students who have completed matriculation in accordance with the requirements set forth in previous calendars should submit two transcripts of their high school record to the Registrar of the University for evaluation.

These general regulations nothwithstanding, the University may in its discretion refuse admission to any applicant.

APPLICATIONS

Students planning to enter first-year Law, whether they have previously attended this University or not, excluding those in the combined course of Arts and Law, should apply for admission on or before August 15. Where possible they should also arrange for a personal interview with the Dean of the Faculty before that date.

PROMOTION

In the case of a student adversely affected by these regulations the Faculty Council takes into consideration all circumstances within its knowledge which might justify any deviation from the regulations.

1. The pass mark in each subject is 50 per cent, except where otherwise specified.
2. Students in the combined course are required to secure an average of 60% in each of the first two years. In addition, they must obtain second class standing in at least four courses, two of which must be for the second year, before promotion to the third year of the combined course is permitted.
3. Students in each of the three years in Law are required to obtain an average of 60% on the whole of the work of the respective years. If such an average is not obtained by any student in any year, such student will be required to repeat the whole of the work of that year before taking more advanced work.
4. All students for the degree of LL.B. are required to pass a viva voce examination at the end of the third year unless specially exempted by the Faculty. This examination is to be of a general character covering the work of the three years.

Students taking the combined course of B.A., LL.B. are referred to the calendar of the Faculty of Arts and Science for the regulations which apply to students under its jurisdiction.

DETAILS OF THE PROGRAM FOR THE DEGREE OF BACHELOR OF LAWS

All students in first and second years will take part in a moot court argument.

All students in third year will participate as judges in first-year moots.

NOTE: The hours of instruction for both terms of the winter session are shown at the top of each descripion. The first figure in each term indicates lecture-hours and the second laboratory-hours.

Staff of the Faculty

Professors—W. F. Bowker (Dean), A. Smith
Associate Professors—A. R. Thompson, D. J. Sherbaniuk*
Assistant Professor—W. H. Angus
Sessional Lecturer—E. Guttman
Sessional Instructors—W. Anderson, H. Field, W. H. Hurlburt, J. H. Laycraft (Calgary), D. C. McDonald, A. F. Moir, J. W. K. Shortreed.

First Year

Introductory Course (3-0; 0-0)

A. R. THOMPSON AND D. SHERBANIUK

An introduction to the nature and scope of law with reference to the main divisions of English law, the growth of common law and equity, the sources of the law and the doctrine of precedent. The forms of action at common law and the history of pleading are studied together with a

*On leave of absence.

brief examination of modern procedures. A study is made of the Courts of Alberta and the Federal Courts, the growth of legal professional literature and the development of the courts in England.

Contracts (3-0; 3-0)

A. SMITH

Intention to create legal obligations; certainty of terms. Offer and acceptance. Extent to which acceptor bound by conditions of which he is not aware. Genuineness or reality of consent. Form. Parties. Impossibility of performance. Discharge of contract.

Kenny,*Cases on Contract;* Cheshire and Fifoot, *Cases on Contract;* Williston, *A Selection of Cases on Contract;* Anson, *Principles of the English Law of Contract;* Pollock, *Principles of Contract;* Cheshire and Fifoot, *The Law of Contract;* Wright, *Cases on Contract.*

Torts 1 (4-0; 4-0)

W. F. BOWKER

Intentional interference with the person and with land and chattels; the defences thereto; negligent interference with person and property and the defences thereto; contributory negligence and assumption of risks; death in relation to tortious liability; liability of occupiers of land.

Wright, *Cases on the Law of Torts,* 1958; Selected Readings.

Property 1 (3-0; 3-0)

Real Property (2-0; 2-0)

A. R. THOMPSON

The historical background of land in Alberta: in particular, tenure and estate, future interests, concurrent interests, dower rights and incorporeal interests. The Torrens system is related to the land law by a general introduction to the subject of land registration.

Cheshire, *Modern Real Property;* Megarry & Wade, *Law of Real Property;* Laskin, *Cases and Notes on Land Law.*

Personal Property (1-0; 1-0)

D. SHERBANIUK

The nature of personal chattels. Real and personal property distinguished. Property and possession. Transfer of possession. Gifts. Bailment. Duties and liabilities of bailors and bailees *inter se.* Third-party relationship to bailment. Liens and pledges. Acquisition of title without consent of former owner. Bills of Sale Act.

Goodeve, *Personal Property;* Read and MacDonald, *Cases on Personal Chattels;* Williams, *Personal Property.*

Criminal Law (2-0; 2-0)

W. ANGUS

A study of the substantive law of crimes. Consideration of general common law principles and their relevancy to the Criminal Code of Canada is followed by a review of selected offences under the Code. Special problems such as "constructive" murder and insanity receive particular attention.

Mackay, *Cases and Materials on Criminal Law* (1958); *Martin's Criminal Code* (1955 ed. and current annual).

Agency (1-0; 1-0)

A. SMITH

The relationship of Principal and Agent. Capacity of Parties. Appointment of Agents. Married Women as Agents of their husbands. Delegation. Agents binding their Principals; Actual authority; Ostensible Authority and holding out; Contracts under Seal executed by Agents. Ratification. Undisclosed Principals. Duties of Agent to Principal. Duties of Principal to Agent. Determination of agency. Partnership.
Wright, *Cases on Agency;* Bowstead, *A Digest of the Law of Agency;* Powell, *The Law of Agency.*

Criminal Procedure (0-0; 2-0)

W. ANDERSON

Jurisdiction, procedure and powers of criminal courts. Steps from commission of crime to final adjudication on appeal. Crown practice.
The Criminal Code of Canada, Parts XI-XXIV; selected cases.

Second Year

Evidence (2-0; 2-0)

D. C. MACDONALD

The adversary system; judicial notice; relevancy and admissibility including opinion evidence, the hearsay rule and previous conduct; burden of proof and presumptions; the oath, examination and cross-examination of witnesses; competency, compellability and privilege; documentary evidence; hearsay exceptions; parol evidence rule.
J. B. Milner, *Cases and Materials on the Law of Evidence;* Selected Readings.

Equity 1 (2-0; 2-0)

W. H. ANGUS

A brief survey of the historical development of the trust introduces an intensive study of the specialized areas of this institution. Particular attention is given to the intricacies of charitable trusts and the following of trust assets.
Weston, *Cases and Materials on Wills and Trusts* (1957); Keeton, *Law of Trusts* (7th ed., 1957).

Practice 1 (1-0; 1-0)

J. W. K. SHORTREED

An elementary course in principles of practice, confined mainly to a discussion of the Rules of Court and the different steps taken in an action from the commencement of proceedings until entry of judgment after trial. Text required: Rules of Court.

Commercial Law (3-0; 3-0)

A. R. THOMPSON

Bills and notes and sales of goods are studied intensively on the basis of the statutes, cases and texts. The case law concerning bills of sale, chattel mortgages and conditional sale contracts is examined. Creditors' rights under particular statutes including the Bankruptcy Act are

treated generally with emphasis upon setting aside fraudulent conveyances, executions, seizures and suretyship.
Falconbridge, *Banking and Bills of Exchange; Benjamin on Sale;* Chalmers' *Sales of Goods;* Atiyah, *Sale of Goods.*

Insurance Law (1-0; 1-0)

W. H. ANGUS

This course covers some of the general principles affecting insurance contracts including good faith, indemnity, subrogation and insurable interest and then goes on to consider in some detail particular problems arising out of The Alberta Insurance Act in relation to automobile, life and fire insurance.
U.B.C. Cases and Materials on the Law of Insurance; The Alberta Insurance Act.

Wills and Administration (2-0; 2-0)

D. SHERBANIUK

Principles of the Wills Act, including formalities of execution, revocation, revival, republication, types of legacies and principles of construction. Testamentary capacity, fraud and undue influence. Drafting of wills. Appointment of executors and administrators, their powers and duties; probate practice.
Theobald, *Wills,* 11th ed.; Jarman, *Wills,* 8th ed; Bailey, *Wills,* 3rd ed.; Mustoe, *Executors,* 4th ed.; Widdifield, *Executors' Accounts.*

Canadian Constitutional Law (2-0; 2-0)

A. SMITH

Principles applicable to proceedings by and against the Crown and its agencies, including Petitions of Right and declaratory judgments. The British North America Act, particularly the division of legislative jurisdiction between Dominion and provinces.
The British North America Act; selected cases and statutes; Laskin, *Canadian Constitutional Law.*

Domestic Relations (0-0; 2-0)

(TO BE ARRANGED)

Promise to marry and breach thereof. Marriage as a contract. Marriage as a status. Presumption of valid marriage. Void and voidable marriages: minors; mental incapacity; mistakes; duress; degrees of affinity and consanguinity; impotency. Divorce. Judicial separation. Cruelty. Condonation. Collusion.
Eversley, *The Law of Domestic Relations;* Evans, *The Law and Practice Relating to Divorce;* Latey, *Law and Practice and Matrimonial Causes;* Power, *The Law of Divorce in Canada;* selected cases and statutes.

Torts II

W. F. BOWKER

Strict liability; defamation; deceit; interference with advantageous relations; also the law of master and servant with particular reference to the law of torts.

Third Year

Real Property 2 (3-0; 3-0)

(a) (2-0; 2-0)

A. R. THOMPSON

The law relating to land transactions with particular reference to the Land Titles Act; the law of landlord and tenant and of other incorporeal interests in land; the law of oil and gas with respect to land.

Thom, *Canadian Torrens System;* Megarry & Wade, *The Law of Real Property;* Williams, *Canadian Law of Landlord and Tenant;* Lewis and Thompson, *Canadian Oil and Gas.*

(b) (1-0; 1-0)

A. F. MOIR

The law governing agreements for sale of land: the open contract of sale; implied terms; special covenants in agreements for sale. Remedies of vendors and purchasers; election of remedies; cancellation and determination clauses. Deposits and instalments. Mortgages: legal, equitable and statutory. Foreclosure; sales; redemption; possession and attornment.

McCaul, *Remedies of Vendors and Purchasers;* Falconbridge, *Law of Mortgages.*

Equity 2 (1-0; 1-0)

A. SMITH

Historical introduction. Nature of Equitable Rights. Priorities: *Bona Fide* Purchaser for value without Notice: *Qui Prior est tempore potior est jure,* and the rule in Dearle v. Hall. Doctrines of Conversion, Election, Performance, Ademption and Satisfaction. Mistake, Misrepresentation, Fraud, and Undue Influence. Penalties and Forfeitures. Restrictive Covenants. Injunctions. Specific Performance. Mutuality. Part Performance.

Smith and Read, *Cases on Equity;* Maitland, *Equity;* Hanbury, *Modern Equity;* Snell, *Principles of Equity.*

Practice 2 (2-0; 2-0)

J. W. K. SHORTREED

A more advanced course in the principles of practice, based on the rules of court, a selected case list furnished by the lecturer, and with reference to standard works on practice, such as Holmested and Langton's *Judicature Act.* Rules of Court.

Recent Cases and Legislation (1-0; 1-0)

W. F. BOWKER AND W. H. ANGUS

Students are given a series of practical problems, usually involving statute law as well as case law, and are required to give an opinion or write a brief. Stress is laid on the technique of research and of writing; certain recent cases are critically examined, and relevant statutes are studied from the standpoint of statutory construction as well as content. Each student is required to write a case comment on a recent Canadian case.

Administrative Law (1-0; 1-0)

W. H. Angus

This course is designed to provide a practical appreciation of the administrative process in relation to its judicial counterpart. As well as studying the customary areas of delegation, characterization of function, natural justice, judicial review and remedies, the student will participate in a project requiring study of a particular administrative tribunal.

Abel, *Cases and Materials on Administrative Law* (1955); de Smith, *Judicial Review of Administrative Action* (1959); Griffith and Street, *Principles of Administrative Law* (2nd ed., 1957).

Company Law (2-0; 2-0)

D. Sherbaniuk

Unincorporated associations. Partnerships. Companies; incorporation under provincial and federal legislation; history of the rise of joint stock companies; the nature of a corporation; corporate criminal liability; the doctrine of *ultra vires;* the indoor management rule; company promotion; formalities of company contracts; capitalization of companies; membership in companies; rights and liabilities of shareholders; dividends; directors.

Gower, *Modern Company Law;* Alberta Partnership Act; Dominion Companies Act; Alberta Companies Act; Alberta Securities Act; Selected cases and readings.

Conflicts of Law (1-0; 1-0)

A. Smith

Characterization. Domicil. Choice of law. Marriage — form, capacity; Succession — moveables, immovables; Restrictions on power of testamentary disposition; Revocation of a will by subsequent marriage; Proprietary rights of spouses; Legitimacy; *Legitimatio per subsequens matrimonium;* Tort; Contract. The doctrine of *renvoi.* Jurisdiction: General; Divorce; Nullity of Marriage; Custody of infants.

Falconbridge, *Cases on the Conflict of Laws;* Morris, *Cases on Private International Law;* Dicey, *The Conflict of laws;* Cheshire, *Private International Law;* Falconbridge, *Essays on the Conflict of Laws;* Schmitthoff, *English Conflict of Laws;* Graveson, *The Conflict of Laws;* Wolff, *Private International Law.*

Jurisprudence (2-0; 2-0)

W. F. Bowker

The philosophy of law, including the natural law, historical, positivist and sociological viewpoints. The analysis of law, including classification and sources, and legal concepts such as rights and duties, negligence, personality, property and possession. The study of law on the basis of interests.

Paton, *Jurisprudence;* Friedmann, *Legal Theory;* Stone, *The Province and Function of Law;* Salmond, *Jurisprudence.*

Taxation (2-0; 2-0)

D. Sherbaniuk

The scope and purpose of taxation. The taxing power: constitutional problems. Personal jurisdiction. Property jurisdiction. Statutory in-

terpretation. Problems of death duty legislation. Gift tax. Income tax: general principle; income from services, property and business; deductions; receipt and measurement of income.

LaBrie and Sherbaniuk, *Cases and Material on Taxation;* LaBrie, *Introduction to Income Tax Law—Canada;* Dominion Succession Duty Act, Estate Duty Act, Income Tax Act.

Legal Accounting (2-0; 2-0)

J. D. CAMPBELL

The first portion of the course will cover the introduction to the principles and mechanics of accounting as required by the Alberta Bar Society covering accounts of practising lawyers. This will entail instruction in double entry bookkeeping principles, general maintenance of books for law offices, maintenance of books for recording of trust funds, control of disbursement of funds, and preparation of income and expense statements and balance sheets.

The second section of the course will include examination of the application of accounting principles in the various areas of income taxation, company and municipal law, management of estates, bankruptcy and winding up procedures.

THE COMBINED COURSE OFFERED FOR THE DEGREES OF BACHELOR OF ARTS AND BACHELOR OF LAWS

The Arts portion of the combined course is as follows (for details see the Calendar of the Faculty of Arts):

First Year

English 200, Latin 200 or French 200 or German 200, History 210, Economics 200 or Political Science 200 or Philosophy 240, a science or a mathematics course.

Second Year

No student may enter the second year of the combined course unless he has successfully completed the first year with an average of not less than 60%.

Five areas of concentration are allowed:

1. Two of Economics 310, 330, 340, 350, or 370.
   History 350 (British History).
   Senior English or senior language.
   Approved B or C option.
2. Two of Political Science 320, 330, 350, 310.
   History 350.
   Senior English or senior language.
   Approved B or C option.
3. History 350.
   Approved senior History.
   Approved senior Economics or Political Science.
   Senior English or senior language.
   Approved B or C option.
4. Two approved senior English courses.
   History 350.

Approved senior Economics or Political Science.
Approved B or C option, or a senior language.

5. Two approved senior Philosophy courses.
History 350.
Senior English or senior language.
Approved B or C option.

Third Year

Promotion from second to third year in the combined course is contingent upon an average of at least 60% in the second year and second class standing in at least four courses, two of which must be in the second year.

History 450 and the first-year Law courses.

Fourth Year

The second-year Law courses. The degree of B.A. may be granted at the end of the fourth year.

Until his third year of the combined course, the student is under the jurisdiction of the Faculty of Arts. In the third year (his first year of Law) the student is primarily under the jurisdiction of the Faculty of Law but remains under the partial jurisdiction of the Faculty of Arts. Prospective Law students are invited to consult the Dean of the Faculty of Law for advice as to the selection of options or for advice on any other problem.

XV

The Faculty of Medicine

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

The Faculty offers three degree programs.

The program leading to the degree of Doctor of Medicine (M.D.) is described on pages 366 to 381.

The program leading to the degree of Bachelor of Science in Medical Laboratory Science (B.Sc. (M.L.S.)) will be found on pages 384 to 389.

A student or graduate in Medicine may take a year of special work in a branch of medical science and qualify for the degree of Bachelor of Science in Medicine (B.Sc. (Med.)). Full particulars may be obtained from the Registrar. (for the degree of Master of Science, see page 365).

Students' Expenses

The four academic years in the M.D. course will necessitate, on the average, an estimated total expenditure by each student of approximately $6,500.00, including room and board. Annual costs will be roughly a quarter of the total amount, and students are urged to ensure the provision of adequate financial resources. Funds are available as loans and grants in case of need.

Medical Undergraduate Society

Upon the unanimous request of the students, the Board of Governors has authorized the collection of a fee from every student in Medicine for the Medical Undergraduate Society, by which such student acquires membership. This society looks after certain social and cultural activities for the medical students and represents them in various connections, including that of the Canadian Association of Medical Students and Internes.

The University of Alberta Hospital and Associated Hospitals

The University of Alberta Hospital, containing 1,200 beds, is used for clinical instruction and, by special arrangements, six other hospitals are also available for this purpose. These are: The Royal Alexandra Hospital (747 beds), with its special isolation unit for infectious diseases; the Misericordia Hospital (425 beds); the Edmonton General Hispital (530 beds); the Charles Camsell Hospital; the Oliver Mental Hospital, and the Aberhart Memorial Sanatorium.

Requirements for License to Practise

After graduates of the University of Alberta have satisfactorily completed a year's interneship in a hospital approved by the faculty, they are then entitled to be licensed by the College of Physicians and Surgons of this province without further examination and are eligible for provincial registration. To become licensed in any other province of the Dominion, it is necessary, however, either to write the provincial examinations of the licensing body in the province concerned or to gain the qualification of the Medical Council of Canada. The latter carries the right to register in any province provided all the educational requirements of the licensing body of that province are met.

It is the custom of the Medical Council of Canada to hold its examinations at the University of Alberta at specified times. To be eligible for these examinations

a graduate must have completed a year's interneship to the satisfaction of the Faculty and have an enabling certificate from the Registrar of the Provincial College of Physicians and Surgeons. For full particulars in regard to these examinations, consult the Registrar of the College of Physicians and Surgeons of Alberta.

Registration for Practice

The holder of a license to practise must register with the professional organization in the particular province concerned. In Alberta, this is the College of Physicians and Surgeons of the Province of Alberta, and for information regarding provincial registration address the Registrar of the College, Dr. W. Bramley-Moore, Edmonton, Alberta. Students who intend to practise in any other province should secure information from the provincial body concerned as early as possible in their medical course so that they may know of any special educationai conditions which must be fulfilled.

(2) ADMISSION REQUIREMENTS

M.D.

The basic requirements in university credits for admission to the Faculty of Medicine are the satisfactory completion (after senior matriculation) of at least two years of university work approved by the Medical Faculty, including full university courses in organic chemistry, inorganic chemistry, physics and zoology.

Although these four science courses are prerequisites for entrance into the Medical Faculty no special consideration will be given to applicants having other science courses. All students are urged to take the program that they find most interesting, that will still give them these prerequisites.

These requirements can be met in various degree patterns in different faculties. For information, the Registrar should be consulted.

Owing to limited facilities for instruction it has been found necessary to restrict the number of candidates accepted for entrance into the first year of medicine. Consideration for admission under this quota will be given only to those students who have an over-all average of at least 65% in the work of all preceding university years. While admission to Medicine is based largely on academic standing, the lack of essential personal qualities in an applicant may be deemed sufficient cause for refusal of admission. It should be further noted that any student whose work is unsatisfactory to the Faculty will not be permitted to continue in the study of medicine.

All students who wish to enter the first year of Medicine are required to make application to the Registrar on or before April 3. It is desirable that candidates should arrange a personal interview with the Dean or his appointee.

All successful applicants are required, upon acceptance of a position in first-year Medicine, to make a deposit of $25.00 to the Bursar of the University. This deposit will be applied on first-year fees when the student registers in the ensuing term. Should a candidate withdraw after once accepting a position, this deposit will be forfeit.

B.Sc. (M.L.S.)

Candidates must have satisfactory personality and physique and must meet the health and physical requirements of the University of Alberta Health Services. All candidates are required to have a personal interview before their application can be considered complete.

The requirements for admission are as follows: (students from outside Alberta must satisfy the Registrar that their training is equivalent to that required of Alberta students).

(a) A High School Diploma with

(b) "B" or higher standing in the following Grade XII examination subjects:

1. English 30
2. Social Studies 30
3. Mathematics 30
4. Chemistry 30
5. & 6. Two of
   Physics 30
   Biology 30
   French 30 or German 30 or Latin 30

(c) an average in these courses of at least 60%.

A fee of $5.00 is charged for evaluation of documents issued by Canadian educational institutions outside Alberta, and a fee of $10.00 for documents issued by educational institutions outside Canada.

General

These general regulations notwithstanding, the University may in its discretion refuse admission to any applicant.

(3) PROMOTION AND GRADUATION

Examination Results

The Council of the Faculty of Medicine approves the principle that the means of assessing a student's progress and the determining of grades may vary from one department to another, according to the type and nature of the course. Factors other than examination results may be used to a variable extent by instructors in determining grades, but students will be informed at the commencement of the course that such measures will be employed.

First-class standing: 80% or over.
Second-class standing: 65% to 79%.
Third-class standing: 50% to 64%.
Pass marks: 50% in each subject. A general average of 60% is required for students in the M.D. program.

For the purpose of reaching an average mark in the work of each year in the M.D. course, a scheme for determining a weighted average has been adopted. A notice outlining the basis on which this is done will be posted during the session.

Supplemental Examinations

(a) Supplemental examinations for M.D. students are conducted by the University in August of each year, and for B.Sc. (M.L.S.) students in September. A student who has failed any course in the preceding session and who has been granted a supplemental examination may apply to the Registrar, not later than the specified date, for permission to write it.

M.D.:

Under no circumstances will any student who has written final examinations be

permitted to sit for a supplemental examination unless he has attained an average of at least 60% on the year's work, including the failed subject or subjects. Any student neglecting to take or failing to pass a supplemental examination will not be allowed to proceed.

B.Sc. (M.L.S.):

Failure to pass a supplemental examination will necessitate repeating either that course or the whole year at the discretion of the Faculty Council.

(b) *Pass mark*: The pass mark for supplemental examinations is 50% in all courses.

(c) *Illness*: A student who has missed a final examination because of illness may apply (providing that the application is supported by a satisfactory medical certificate) for a deferred final at the time set for the supplemental examinations in his course. A student who cannot take a Christmas final examination because of illness will be granted a deferred final examination at the end of the session; application for such an examination must be made not later than March 4.

Promotion, M.D. Course

Because facilities for instruction are limited it is necessary to ensure that no unsatisfactory student shall usurp a place that could be filled by a deserving one; consequently no one will be allowed to repeat the first year of medicine unless under special circumstances deemed adequate by the Faculty. Moreover, to maintain a proper standard, a student will not be allowed to proceed to any subsequent year of medicine until his present year is fully completed with an average mark of at least 60%.

Requirements for Graduation, M.D. Course

The course leading to the degree of M.D. involves four years of study in the Faculty of Medicine, following which a twelve-month period of interneship must be served in an approved hospital.

To receive the degree of Doctor of Medicine, a student must be at least 21 years old and of good moral character. At least the fourth academic year of medical study must have been spent at this University and all university dues must have been paid. In addition to complying with the requirements for admission and completing the required work of the curriculum, each candidate for the degree of Doctor of Medicine must have been recommended to the General Faculty Council for graduation. The University reserves the right to withhold the granting of the degree of M.D. until the required period of interneship has been completed and approved.

Requirements for graduation include moral and personal as well as educational qualifications, and completion of the formal requirements does not necessarily entitle a candidate to a degree from the University of Alberta. The Faculty bases its recommendations on considerations of character and of ability, attainment and worthiness in general, as well as on the completion of the required subjects in the curriculum.

(4) GRADUATE STUDY

Degree of M.Sc.

By enrolling in the Faculty of Graduate Studies, a medical student holding the degree of B.A. or B.Sc., or a graduate in Medicine, may take special work in a branch of medical sciences to qualify for the degree of M.Sc. See the Calendar of the Faculty of Graduate Studies.

Research

The laboratories of the basic science and clinical departments are open to those who are qualified to undertake investigations. Qualified students may work toward the degrees of B.Sc. and M.Sc. in these subjects. Due to limitation of facilities, such cases will be decided in the light of circumstances at the time. For further information, apply to the head of the department concerned.

(5) PROGRAMS OF STUDY AND DETAILS OF COURSES

The Program Leading to the Degree of Doctor of Medicine

(Details will be found under departmental headings.)

FIRST YEAR

Subjects	Course No.	Total Hours of Instruction
Gross Anatomy and Development	Anat. 411	350
Histology and Neuroanatomy	Anat. 413	250
Biochemistry	Biochem. 411	198
Physiology	Physiol. 411	315
Psychiatry	Psychiatry 411	32
Human Genetics	Human Gen. 411	16
	Total	1161

SECOND YEAR

Subjects	Course No.	Total Hours of Instruction
Anthropology	Anat. 421	15
Applied Anatomy	App. Anat. 421	82
Bacteriology	Bact. 421	198
Biochemistry (clinical)	Biochem. 421	64
Clinical Pathology	Clin. Path. 421	66
Intro. to Med.	Intro. Med. 421	132
Obstet. and Gynaecology	Obst. & Gyn. 421	33
Pathology	Path. 421 & 422	150
Pharmacology	Pharmacol. 421	165
Physical Diagnosis	Phys. Diag. 421	66
Prev. Medicine	Prev. Med. 421	16
Psychiatry	Psychiatry 421	128
Paediatrics	Paed. 421	12
	Total	1127

THIRD YEAR

Subjects	Course No.	Total Hours of Instruction
Medicine	Clin. Med. 431	240
Obstetrics and Gynaecology	Obst. & Gyn. 431	108
Ophthalmology	Ophth. 431	37
Oto-Laryngology	O.L. 431	37
Pathology	Path. 431	165
Paediatrics	Paed. 431	210
Preventive Medicine	Prev. Med. 431	50
Psychiatry	Psych. 431	38
Radiology	Rad. 431	56
Surgery	Clin. Surg. 431	240
Survey of Disease	Surv. Dis. 431	186
	Total	1367

FOURTH YEAR

Subjects	Course No.	Total Hours of Instruction
Anaesthesia	Anaesth. 441	34
Medicine	Clin. Med. 441	356
Medical Jurisprudence and Toxicology	Med. Jur. & Tox. 441	22
Medical Economics and Ethics	Med. Econ. & Eth. 441	11
Obstetrics and Gynaecology	Obst. and Gyn. 441	186
Ophthalmology and Oto-Laryngology	Ophth. O.L. 441	34
Pathology	Path. 441	33
Paediatrics	Paed. 441	64
Preventive Medicine	Prev. Med. 441	16
Psychiatry	Psych. 441	136
Radiology	Rad. 441	34
Surgery	Clin. Surg. 441	356
Therapeutics	Therap. 441	33
	Total	1315

Details of Courses Leading to the Degree of Doctor of Medicine

NOTE: The total hours of instruction in a course are shown at the top of each course description. Since the times devoted to lectures, clinics, demonstrations and conferences will vary, no attempt has been made to break down the overall figure.

The trimester system and clinical clerkships will begin in third year. A clerkship will consist of bedside clinics, small group teaching, and the assigning of individual cases which the students must work up for themselves.

The trimesters will be divided for clerkships as follows:—

THIRD YEAR (each week contains 24 hours devoted to clerkship)

1*st Trimester*

Medicine—11 weeks

(22 hours of this time will be devoted to clinics in Psychiatry)

2nd Trimester

Surgery—10 weeks
Gynaecology—1 week

3rd Trimester

Paediatrics—9 weeks
Obstetrics—1 week (living in hospital)
Obstetrics and Newborn—1 week

(30 hours of the time on Paediatrics will be devoted to clinics in Obstetrics)

FOURTH YEAR

1st Trimester

Medicine—10 weeks—340 hours
Ophthalmology & R.O.L.—1 week—34 hours

2nd Trimester

Surgery—9 weeks—306 hours
Anaesthesia—1 week—34 hours
Radiology—1 week—34 hours

3rd Trimester

Obst. and Gyn.—5 weeks—170 hours*
Psychiatry—4 weeks—136 hours
Paediatrics—2 weeks—68 hours*

*Does not include hours at night living in.

General Courses

The following courses are given by two or more departments in co-operation with each other, under the general direction of the curriculum committee.

Introduction to Medicine 421 (Second Year) (132 hours)

A series of theatre clinics in which patients will be presented. This course is given by members of the various clinical and basic science departments and is designed to introduce the student to the various manifestations of disease and their significance.

Physical Diagnosis 421 (Second Year) (66 hours)

A course in Physical Diagnosis and History Taking given by members of the various clinical departments. This course will consist largely of bedside teaching to small groups.

Preventive Medicine

While definite times are scheduled for this course in second, third and fourth years, certain aspects of the subject are discussed at irregular intervals in various pre-clinical and clinical courses.

Survey of Human Disease 431 (Third Year) (186 hours)

6 hours per week of "case centred" presentations designed to cover, in general, those diseases usually covered by departments of Surgery, Medicine and Paediatrics.

Applied Anatomy 421 (second year) (82 hours)

H. L. Richard and H. E. Duggan

This course gives the various aspects of Radiological and Surgical Anatomy divided as follows:—

Radiology will consist of weekly lectures in normal radiographic anatomy for one term. The second term will cover radiobiology including various types of radiation, production of x-rays, radiation effects, the theory of the atom, radioactive isotopes and radiation hazards; also covered will be the radiographic appearance of pathological lesions of all systems of the human body.

Surgical anatomy will consist of one hour lecture-demonstrations presented by practising members of the department of surgery throughout the entire second year. Emphasis is laid on surgical exposures, anatomical regions of surgical importance, and the applied anatomy of standard surgical techniques.

Courses by Departments

ANAESTHESIA

This department takes part in the teaching exercises in the Introduction to Medicine and Survey of Disease courses.

Staff:—

Professor—E. A. Gain
Assistant Professor—F. C. Haley
Lecturer—D. F. Cameron
Instructors—G. T. Moodie, N. W. Nix
Sessional Instructor—W. H. Graham
Honorary Instructor—J. E. Carmichael

Anaesthesiology 441 (fourth year) (34 hours)

One week of training in the operating room and in discussions with members of the staff in Anaesthesiology. This will be given during the Surgery Trimester.

ANATOMY

This department takes part in the courses in Introduction to Medicine and Survey of Disease.

Staff:—

Professors—H. E. Rawlinson (Head), W. R. Salt, J. S. Thompson
Associate Professor—Margaret T. Fish
Assistant Professors—R. J. Bury, L. B. Erikson, Margaret W. Thompson
Instructor—Eva O. Hagen
Honorary Members—N. J. Minish, K. A. McMurchy

411. Gross Anatomy (first year) (350 hours)

H. E. Rawlinson and J. S. Thompson

Gross anatomy and embryological development of the human body.
Textbooks: Gray, *Textbook of Anatomy;* or Lockhart, Hamilton and Fyfe, *Anatomy of the Human Body;* Aitken or Cunningham, *Manual;* Gould, Stedman or Dorland, *Dictionary;* Grant, *Atlas.*

413. Microsopic Anatory (Histology and Neuroanatomy) (first year) (250 hours)

W. R. Salt and R. F. Shaner

The minute anatomy and development of the elementary tissues and organs (about 150 hours) and the structure of the human nervous system and organs of special sense (about 100 hours).

Textbooks: Bloom, *Histology;* Ranson-Clark, *Anatomy of the Nervous System.*

421. Anatomy (second year, Anthropology) (15 hours)

R. F. Shaner

A brief survey of ancient man and of the anatomical evidence of man's place in nature.

Prerequisite: Anatomy 11 or 12.

411. Human Genetics (first year) (16 hours)

M. W. Thompson

An introductory course in human heredity and some medical applications of genetic knowledge.

BACTERIOLOGY

The department of Bacteriology takes part in the presentations in the Introduction to Medicine and Survey of Disease courses.

Staff:—

Professors—G. E. Myers, R. D. Stuart (Head)
Associate Professors—E. J. K. Penikett, J. W. Carmichael
Assistant Professors—Sheila Toshach, Mary E. Williams
Sesional Instructors—Yvonne Goodman, S. I. Hnatko

421. Pathogenic Bacteriology (second year) (198 hours)

R. D. Stuart, E. J. K. Penikett, M. E. Williams and J. W. Carmichael

The relation of bacteria, viruses, fungi and protozoa to disease. Bacteriological procedures applicable to the diagnosis, control and treatment of infectious disease.

Textbooks: Whitby and Hynes, Burrows.

231. Bacteriology — Introductory Course (100 hours)

J. W. Carmichael

Specifically for certain groups of nurses.

BIOCHEMISTRY

This department takes part in the Introduction to Medicine and Survey of Disease courses.

Staff:—

Professors—*H. B. Collier (Head), J. Tuba
Associate Professors—L. B. Smillie, Mary S. Spencer
Assistant Professors—C. M. Kay, E. T. Pritchard
Sessional Instructor—D. J. Campbell
Honorary Members—L. E. McLeod, A. G. Stewart

*On leave of absence.

411. General Course (first year) (198 hours)

JULES TUBA AND L. B. SMILLIE

Composition, general and physical-chemical considerations of the cell; chemistry of carbohydrates, lipids and proteins; enzymic catalysis; digestion and absorption; general considerations, composition and functions of the blood; specialized extracellular fluids; metabolism; biochemistry of specialized tissues; nutrition; biochemistry of endocrine glands; special topics including atherosclerosis, the biochemistry of cancer, and metabolism of the central nervous system.

Texts: Cantarow and Schepartz, *Biochemistry;* Harrow and Mazur, *Textbook of Biochemistry.*

Reference text: White, Handler, Smith and Stetten, *Principles of Biochemistry.*

N.B.—As this course will be completed before the end of the academic year, the course in Biochemistry 421 will begin during the last few weeks of the second term of the First Year, and will continue through the first term of the Second Year.

421. Clinical Biochemistry (second year) (64 hours)

H. B. COLLIER AND STAFF

The work in this course will begin at the completion of the course in Biochemistry 411, toward the end of the second term in the First Year, and will continue throughout the first term of the Second Year.

A practical course in the chemical examination of urine, blood, etc., with discussion of the clinical significance of the findings.

Reference Texts: Hawk, Oser, and Summerson, *Practical Physiological Chemistry;* Cantarow and Trumper, *Clinical Biochemistry;* Stewart and Dunlop, *Clinical Chemistry in Practical Medicine;* Varley, *Practical Clinical Biochemistry.*

MEDICINE AND CLINICAL MEDICINE

The Department of Medicine takes a major share of the teaching in the courses on Introduction to Medicine, Physical Diagnosis, and Survey of Disease. The formal presentations by this department are largely limited to these courses.

STAFF:—

Professor—D. R. Wilson

Associate Professors—R. S. Fraser, J. A. L. Gilbert, G. Monckton, P. H. Sprague

Assistant Professors—Inge Dyrenfurth, L. E. McLeod

Clinical Professors—J. F. Elliott, K. A. Hamilton, C. B. Rich, R. K. C. Thomson, B. M. Wheeler

Assistant Clinical Professor—J. Dvorkin

Lecturers—G. I. Bell, W. Bramley-Moore, E. F. Donald, F. G. Elliott, S. Greenhill, E. G. Kidd, A. S. Little, M. Matas, H. H. Stephens, N. Zalesky, R. H. Whiting

Instructors—T. H. Aaron, D. M. Bell, G. D. Brown, A. Cairns, W. J. Downs, A. M. Edwards, J. C. Hopkyns, C. LeFebvre, C. W. McCormack, C. G. Preece, M. M. Sereda, L. Sherman, B. R. J. Sproule, W. R. St. Clair, M. K. Young

Sessional Instructors—R. M. Bala, A. Genser, J. R. Hilliard, I. H. Holmes, C. G. Ramsay, J. M. Ryan, R. Rossall, D. L. C. Judge

(Dermatology)
Assistant Clinical Professor—P. L. Rentiers
Lecturer—A. E. Dixon
(Rehabilitation Medicine)
Lecturer—M. T. F. Carpendale
(Therapeutics)
Assistant Clinical Professor—F. S. B. Rodman
(Medical History)
Lecturer—H. E. Rawlinson
Honorary Members—R. E. Bell, A. F. Anderson

431. Medicine (third year) (240 hours)

D. R. Wilson and Staff

A large portion of the Survey of Disease course will be given by the department of Medicine. Besides this the student will have a clerkship of 240 hours. in which he will do complete case history, physical examination, laboratory work and follow-up on assigned cases. There will also be bedside clinics, conferences and case presentations by the students.
Textbook: Cecil, *Textbook of Medicine.*

441. Medicine (fourth year) (356 hours)

D. R. Wilson and Staff

This is primarily a Clinical Clerkship of 10 weeks in various Edmonton Hospitals and in the outpatient department. An additional 16 hours is devoted to a reading course in this subject.
Textbooks: Medicine—Harrison, *Principles of Internal Medicine*; Leopold, *Principles and Methods of Physical Diagnosis;* Cecil's *Textbook of Medicine.* Clinical Medicine—Hutchinson and Hunter, *Clinical Methods;* Todd and Sandford's *Clinical Diagnosis by Laboratory Methods;* Best and Taylor's *Physiological Basis of Medical Practice;* Walsh, *Diseases of the Nervous System;* Sutton and Sutton, *Diseases of the Skin;* Pillsbury, Sulsberger and Livingwood, *Manual of Dermatology;* Maxwell, *Diseases of the Chest;* Musser and Wohl, *Internal Medicine;* McLester and Darby, *Nutrition and Diet in Health and Disease;* Davidson, *Principles and Practice of Medicine.* Reference books: French, *Differential Diagnosis of Main Symptoms;* Purves Stewart, *Diagnosis of Nervous Diseases;* Cabot and Adams' *Physical Diagnosis;* Osler, *Practice of Medicine;* Conybeare, *Practice of Medicine;* Meakins, *Practice of Medicine;* Osler and McRae, *Modern Medicine;* Tidy's *Synopsis of Medicine;* Price's *Practice of Medicine;* Brian's *Diseases of the Nervous System;* Year Books of General Medicine, Therapeutics and Neurology, Endocrinology and Psychiatry; Boyd's *The Pathology of Internal Disease;* Stitt and Strong, *Diagnosis, Prevention and Treatment of Tropical Disease;* Rawling, *Landmarks and Surface Markings;* Percival, *An Introduction to Dermatology;* Friedberg, *Diseases of the Heart;* Sunderman and Boerner, *Normal Values in Clinical Medicine;* Leopold, *The Principles and Methods of Physical Diagnosis;* Williams, *Textbook of Endocrinology*; Duncan, *Diseases of Metabolism.*

441. Therapeutics (fourth year) (33 hours)

F. B. Rodman

A series of lectures on the therapy of various disease states, will be given to students in their final year.

Textbooks: Beckman, *Treatment in General Practice;* Blumer, *Therapeutics of Internal Disease;* Huston, *The Art of Treatment;* Conn, *Current Therapy; Cornell Conferences on Therapy;* Modell, *The Relief of Symptoms.*

Reference books: *Pharmaceutical Guide, Canada,* 1954.

441. Medical Economics and Ethics (fourth year) (11 hours)

A short series of lectures devoted to these topics is given under the direction of the department of Medicine.

421. Clinical Pathology (second year) (66 hours)

J. F. Elliott, R. E. Bell, D. Newson

Lectures on the use and interpretation of laboratory methods as diagnostic aids. Practical work (second term) on routine microscopic examination of urine, feces, sputum and C.S.F. Hemoglobinometry. Enumeration of leucocytes and erythrocytes, preparation and examination of blood smears. Histopathology of reticulo-endothelial system. Helminthology.

Textbooks: T. H. Ham, *A Syllabus of Laboratory Examinations in Clinical Diagnosis;* W. Boyd, *Textbook of Pathology;* Anderson, *Pathology;* Wintrobe, *Clinical Hematology.*

Students will be required to supply their own Hemocytometers and Hemoglobinometers.

OBSTETRICS AND GYNAECOLOGY

This department will take part in certain of the exercises in the courses on Introduction to Medicine, Survey of Disease, and Physical Diagnosis.

Staff:—

Professor—J. R. Vant

Associate Professor—T. R. Nelson

Assistant Professor—W. F. Ferguson

Clinical Professor—R. H. Horner

Assistant Clinical Professors—T. R. Clarke, W. D. Frew, Margaret M. Hutton, A. H. MacLennan

Lecturers—D. M. Bell, J. A. Boyd, S. S. Parlee, E. Quehl, D. C. Ritchie, Y. Yoneda

Instructors—J. Bugis, F. R. J. Dorsey, J. R. Leeder

Clinical Tutor—L. B. Brown

Teaching Fellow—Evelyn G. T. Trueman

Honorary Members—A. Day, K. Baker, J. S. Barr, L. J. Gans, D. H. Husel, D. J. Moyer, N. W. F. Weir

421. Obstetrics and Gynaecology (second year) (33 hours)

J. R. Vant and Staff

This course embodies introductory lectures on Obstetrics and Gynaecology and the clinical application thereto.

There is also a hospital "living in" period of 4 days for each student during

which time he receives a practical introduction to the phenomenon of parturition and the care of the immediate newborn.
Textbook: Willson, Beecham, Forman et al., *Obstetrics and Gynaecology.*

431. Obstetrics and Gynaecology (third year) (108 hours)

J. R. VANT AND STAFF

This course reviews the previous year's teaching and completes the formal lectures on the clinical diagnosis and management, as well as the pathologic processes, involved in obstetrical and gynaecological problems.
During each trimester, conferences are held weekly on clinical problems in gynaecology.

Each student "lives in" hospital for one week wherein he resumes his study of the problems of pregnancy, parturition and the immediate newborn state.
Textbooks: Eastman, *Obstetrics;* Novak and Novak, *Textbook of Gynaecology.*
References: Novak and Novak, *Obstetrical and Gynaecological Pathology,* 4th edition; Current literature.

441. Obstetrics and Gynaecology (fourth year) (186 hours)

J. R. VANT, W. F. FERGUSON AND STAFF

There are no formal lectures to students of the fourth year. Each student will enjoy a period of five weeks of Clinical Clerkship, part of which (two weeks) will be spent "living in" the hospital. A series of informal group discussions on the mechanics of obstetrics will be held during each trimester. On alternate Saturdays, a group discussion (Reading Course) will be arranged. Students will attend the Out Patient Clinic in small groups throughout the year.

References: Jeffcoate, *Principles of Gynaecology;* Te linde, *Operative Gynaecology,* 2nd edition; Douglas and Stromme, *Operative Obstetrics;* Munro Kerr (Moir), *Operative Obstetrics.*

PAEDIATRICS

The department of Paediatrics takes a major portion of the teaching in Physical Diagnosis, Introduction to Medicine, and Survey of Disease as well as conducting the following teaching exercises.

STAFF:—

Professor—J. K. Martin
Associate Professors—A. G. Stewart, W. C. Taylor
Clinical Professor—J. Calder
Associate Clinical Professor—T. A. Gander
Assistant Clinical Professors—H. B. Armstrong, L. C. Grisdale, Kathleen A. Swallow
Lecturers—L. E. Beauchamp, N. F. Duncan, R. Poirier
Instructors—G. Conradi, P. J. Kimmitt
Sessional Instructors—R. P. Makaroff, Jean C. Nelson

421. Paediatrics (second year) (12 hours)

An introduction to Paediatrics.

431. Paediatrics (third year) (210 hours)

J. K. Martin and Staff

The Paediatric Aspects of Disease will be presented in the Survey of Disease course. There is a clerkship of 210 hours in which the student will be assigned cases on which he must do a complete history, physical examination and laboratory work and be prepared to present his cases at any time. During this time there will also be bedside clinics and conferences.

Reference Books: Paterson and McCreary, *Paediatrics;* and Silver, Kemp and Bruyn, *Paediatrics.*

441. Paediatrics (fourth year) (64 hours)

During a two week clerkship in Paediatrics students will be given some patient responsibility and be under the guidance of a Preceptor.

Reference Books: Nelson, *Textbook of Paediatrics;* Levine, *Advances in Paediatrics;* Year Books of Paediatrics; Paediatric Clinics of North America; Gesell and Amatruda, *Development Diagnosis;* Watson and Lowery, *Growth and Development;* Clement A. Smith, *Physiology of the Newborn.*

PATHOLOGY

This department takes part in the teaching in the Introduction to Medicine and Survey of Disease courses.

Staff:—

Professors—J. W. Macgregor (Head), J. H. Stirrat

Associate Professor—G. O. Bain

Assistant Professors—R. E. Bell, S. Hanson, T. K. Shnitka, M. Weinlos, P. W. Davey, G. R. Macdonald

Assistant Clinical Professor—M. M. Cantor

Lecturer—M. M. Sereda

Instructors—D. I. Buchanan, H. E. Bell, A. S. Little, B. Michalyshin, D. C. Ritchie, R. J. Swallow

Sessional Instructors—Barbara J. Best, Jean I. Matheson, Shirley E. J. Bissett, Darlene J. Comfort, Donna L. Buxton, Ellenora M. Stobbe

Demonstrators—Eleanor Bergen, Lillian Luashuk, Dora A. Newson

Honorary Member—M. E. Hall

421. and 422. General Pathology (second year) (150 hours)

R. E. Bell, D. Newson and D. I. Buchanan

This course consists of lectures and laboratories for the full academic year. The first 22 weeks are devoted to general pathology, and the remaining 11 weeks to special pathology. The teaching of special pathology will be continued into the third year.

Textbooks: Boyd, *Textbook of Pathology,* 6th ed.; Bell, *Textbook of Pathology,* 7th ed.; Robbins, *Textbook of Pathology,* 1st ed.

421. Clinical Pathology (second year) (66 hours)

R. E. Bell, D. Newson and D. I. Buchanan

Lectures on the use and interpretation of laboratory methods as diagnostic aids. Practical work (second term) on routine microscopic examination of

urine, feces, sputum and C.S.F. Hemoglobinometry. Enumeration of leucocytes and erythrocytes, preparation and examination of blood smears. Histopathology of reticulo-endothelial system. Helminthology.

Textbooks: T. H. Ham, *A Syllabus of Laboratory Examinations in Clinical Diagnosis;* W. Boyd, *Textbook of Pathology;* Anderson, *Pathology;* Wintrobe, *Clinical Hematology.*

Students will be required to supply their own Hemocytometers and Hemoglobinometers.

431. Pathology (third year) (165 hours)

J. W. MACGREGOR, M. WEINLOS AND STAFF

A series of lectures on pathological change in special organs and tissues with concurrent laboratory demonstrations of gross and microscopic pathological material.

Textbooks: Boyd, *Textbook of Pathology,* 6th Ed.; Bell, *Textbook of Pathology,* 7th Ed.; Anderson, *Pathology,* 2nd Ed.; Robbins, *Textbook of Pathology,* 1st Ed.

441. Pathology (fourth year) (33 hours)

J. W. MACGREGOR AND STAFF

Students will attend a clinical-pathological conference, conducted under the supervision of the Department of Pathology, for one hour each week.

441. Medical Jurisprudence and Toxicology (fourth year) (22 hours)

One hour per week for two trimesters dealing with the criminal and civil aspects of legal medicine, and with the action of poisons.

PHYSIOLOGY AND PHARMACOLOGY

This department takes part in the teaching exercises in the Introduction to Medicine and Survey of Disease courses.

STAFF:—

Professors—J. W. Pearce, C. W. Nash
Associate Professors—C. Heath, E. O. Hohn
Assistant Professors—K. M. Chapman, W. H. Cottle, C. N. Gillis
Lecturers—D. F. Cameron, Merva K. Cottle, J. D. Taylor
Instructors—Mary Nursall
Sessional Instructor—R. I. McCalla
Demonstrator—R. F. Taylor
Sessional Demonstrators—C. H. Bigland, Constance H. Campbell, T. E. Emerson, Constance M. Fuller, R. J. M. Shivak, K. B. Wiancko, D. Wilkinson
Teaching Fellows—J. V. Milligan, Celia M. Yates
Honorary Members—R. D. Haryett, T. J. Speakman, R. D. Scrag, D. Triantaphyllopoulos

411. Physiology (first year) (315 hours)

J. W. PEARCE, E. O. HOHN, C. HEATH AND PHYSIOLOGY STAFF

The course consists of three parts. The first, largely given in the first term, comprises a study of basic physiology of cells and tissues, the circulatory, digestive and respiratory systems, and the phenomena of digestion, absorption, metabolism and excretion. The second part, given over the first three months

of the second term, comprises the physiology of nerves and synapses, muscle, spinal reflex systems, brain centres and tracts, the special senses, the autonomic nervous system and aspects of behaviour. The endocrine glands, reproduction and temperature regulation will be considered in the last month of the term.

The course content is presented in lectures, demonstrations, laboratory exercises and seminars. Clinical demonstrations are included.

Textbooks: Houssay, *Human Physiology,* 2nd ed.; Guyton, *Textbook of Medical Physiology;* Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed.; Lovatt Evans, *Principles of Human Physiology,* 12th ed.; Wright, *Applied Physiology,* 9th ed.; Fulton, *Textbook of Physiology,* 17th ed.; Bard, *Medical Physiology,* 10th ed.; Best and Taylor, *Physiological Basis of Medical Practice,* 6th ed.

Reference Texts: Davson, *A Textbook of General Physiology;* Giese, *Cell Physiology;* Rushmer, *Cardiac Diagnosis;* Eccles, *The Neurophysiological Basis of Mind;* Eccles, *The Physiology of Nerve Cells;* Turner, *General Endocrinology,* 2nd ed.; Williams, *Textbook of Endocrinology,* 2nd ed.

421. Pharmacology (second year) **(165 hours)**

C. W. Nash, C. N. Gillis and Pharmacology Staff

A course on the pharmacological action of drugs selected for their physiological and clinical significance. The course includes a study of basic pharmacological principles as applied to representative drugs having their primary actions on various organ systems of the body. Classes of drugs studied include general and local anaesthetics; hypnotics, sedatives and anticonvulsants; analgesics; central nervous system stimulants; autonomic and curariform drugs; histamine and antihistaminics; cardiovascular drugs; diuretics; heavy metals and their antagonists; haemostatic agents and anticoagulants; chemotherapeutic agents. The course also includes a series of lectures on prescription writing.

Instruction is given in the form of lectures. demonstrations and laboratory exercises. A series of written reports based on laboratory exercises is required of each student.

Textbooks: Goodman and Gilman, *The Pharmacological Basis of Therapeutics,* 2nd Edition; Drill, *Pharmacology in Medicine,* 2nd Edition; Grollman, *Pharmacology and Therapeutics,* 3rd Edition; Beckman, *Drugs, Their Nature, Action and Use.*

PREVENTIVE MEDICINE

The department of Preventive Medicine contributes to the teaching exercises of the clinical departments, and in the Introduction to Medicine and Survey of Diseases courses. The psycho-social, economic, and preventive aspects of disease are discussed.

Staff:—

Professor—S. Greenhill

Lecturers—H. L. Hogge, E. S. O. Smith

Sessional Instructors—G. H. Mall, C. G. Preece

421. Preventive Medicine (second year) **(16 hours)**

A short course in measurements and statistics as applied to medicine.

431. Preventive Medicine (third year) (50 hours)

(a) A course designed to outline the administration, function and role of a Department of Public Health in the practice of preventive medicine. (36 hours)

(b) Demography, Population Trends, Epidemiology of Non-Communicable Diseases and Occupational Health. (14 hours)

441. Preventive Medicine (fourth year) (16 hours)

Contemporary Society—a course designed to indicate the role played by psycho-social-economic factors in the production of today's morbidity.

Suggested Reading: A. H. Gale, *Epidemic Diseases,* Pelican A456; D. Hunter, *Health in Industry,* Pelican A441; J. N. Morris, *Uses of Epidemiology,* Livingstone Ltd.; J. Pemberton et al., *Recent Studies in Epidemiology,* Blackwell; L. J. Witts et al., *Medical Surveys and Clinical Trials,* Oxford; G. R. Hargreaves, *Psychiatry and the Public Health,* Oxford; Association of Teachers of Preventive Medicine, *Readings in Medical Care,* Chapel Hill 1958; Galdston et al., *Family in Contemporary Society,* International University Press; M. Balint, *The Doctor, His Patient and The Illness,* International University Press.

PSYCHIATRY

STAFF:—

Professor—K. A. Yongs

Associate Professor—W. Forster

Assistant Professors—H. M. Barker, I. Chenard

Clinical Professor—S. Spaner

Assistant Clinical Professors—J. Guild, A. D. MacPherson, A. R. Schrag

Sessional Instructors—G. D. Carson, F. J. Edwards, Mary A. Morrison, H. Pascoe, J. L. Paterson, D. L. G. Phillips, Z. Selinger, W. E. Sigurdson

Teaching Fellow—M. B. Moore

Honorary Members—E. M. Jellinek, R. R. MacLean, L. J. leVann, T. C. Michie, D. L. McCullough, W. J. McAlister

411. Psychiatry (first year) (32 hours)

(a) An introduction to the principles of psychological medicine (12 hours).

(b) Psychology of human development (20 hours).

421. Psychiatry (second year) (128 hours)

(a) Psychodynamic mechanisms of personality, normal and pathological (32 hours).

(b) Psychophysiology—the principles and mechanisms involved in psychosomatic disorder (16 hours).

(c) Dimensions of personality—specific means of assessing personality (16 hours).

(d) The principles and practice of interviewing—demonstrations of and practice in interviewing patients (32 hours).

(e) Personality disorders—a discussion and demonstration of the nature and cause of neurotic, psychotic and character disorders (32 hours).

431. Psychiatry (third year) (38 hours)

(a) Personality disorders—a discussion and demonstration of the nature, cause and treatment of neurotic, psychotic and character disorders (continuing from second year) (16 hours).

(b) Diagnosis and treatment of personality disorders—experience in diagnosis and treatment through small group clinics (22 hours).

441. Psychiatry (fourth year) (136 hours)

(a) Clinical clerkship of one month, two weeks at University Hospital Department of Psychiatry and two weeks at one of the Provincial Mental Hospitals.

Textbooks: English and Finch, *Introduction to Psychiatry;* Noyes and Kolb, *Modern Clinical Psychiatry;* Mayer-Gross, Slater and Roth, *Clinical Psychiatry;* Weiss and English, *Psychosomatic Medicine;* Tredgold, *Mental Deficiency.*

RADIOLOGY

The Department of Radiology takes part at appropriate times in the presentations in the Introduction to Medicine and Survey of Disease and Applied Anatomy courses.

STAFF:—

Professor—H. E. Duggan
Lecturers—R. M. Clare, C. F. Hyndman, M. Mallett
Instructors—R. M. Hall, D. A. L. Dick, C. E. Holmes
Honorary Member—R. Procter

431. Radiology (third year) (56 hours)

H. E. DUGGAN AND STAFF

The members of the Department of Radiology will take part in the presentation of the Survey of Disease Course. This will be in a form of combined lectures and demonstrations given in conjunction with the Departments of Medicine, Surgery and Paediatrics.

441. Radiology (fourth year) (34 hours)

H. E. DUGGAN AND STAFF

One or two fourth year students will spend a complete week in the Department of Radiology under the supervision of one of the Radiologists. One day of this week will be spent in the Radioisotope Laboratory where demonstrations will be given on the use of various radioactive isotopes.

SURGERY AND CLINICAL SURGERY

In the first year of the course representatives of the Department of Surgery are in attendance at the laboratory periods in Anatomy and Physiology in order that the application of these subjects to clinical surgery may be indicated.

In the second year of the course the Department of Surgery, including the Surgical Specialties, in association with the other clinical and preclinical departments, contributes to the integrated panel discussions and illustrative case demonstrations which constitute the course "Introduction to Medicine". This course consists of

two two-hour presentations per week throughout the year. In this year also the department take part in Applied Anatomy 421.

STAFF:—

Professors—W. S. Anderson, W. C. MacKenzie (Head of the Department and Dean of the Faculty)

Associate Professors—C. M. Couves, R. C. Harrison, R. A. Macbeth

Clinical Professors—B. Michalyshin, G. L. Willox, T. S. Wilson

Assistant Clinical Professors—J. C. Callaghan, A. W. Hardy, R. J. Johnston, S. Kling, A. B. McCarten, L. P. Mousseau, M. Weinlos

Lecturers—C. A. Allard, W. F. M. Hall, E. Hitchin, H. L. Richard, W. A. Shandro

Instructors—E. S. Allin, M. Besney, G. R. Boileau, C. S. Dafoe, R. G. Davis, W. A. Maclean, B. D. Margolus, H. Meltzer, C. A. Ross, W. A. Strutz, A. E. Theman, C. H. W. Weinlos, H. T. G. Williams (Clinical Tutor)

Sessional Instructors—J. D. M. Alton, W. S. Archibald, H. D. Hebb, R. E. Jesperson, M. M. Laskin

(EXPERIMENTAL SURGERY)
Director—R. C. Harrison
Associate Professor—K. P. Kowalewski
Lecturer—E. C. Elliott

(NEUROSURGERY)
Clinical Professor—G. K. Morton
Assistant Clinical Professor—T. J. Speakman

(OPHTHALMOLOGY)
Associate Professors—T. A. S. Boyd, J. W. Duggan (Head)
Lecturer—R. W. Robertson
Honorary Member—M. R. Marshall

(ORTHOPAEDIC SURGERY)
Clinical Professor—O. Rostrup
Lecturers—G. W. Cameron, F. G. Day, D. C. Johnston, J. P. Moreau, G. L. Wilson, G. C. Gray
Instructor—R. S. Henderson
Sessional Instructors—J. L. Gulley, J. R. Huckell, A. H. McKenzie

(OTO-LARYNGOLOGY)
Clinical Professor—K. A. C. Clarke
Assistant Clinical Professor—W. S. S. Armstrong
Lecturer—T. C. Wilson
Instructor—P. T. Quinlan

(UROLOGIC SURGERY)
Clinical Professor—J. O. Metcalfe
Assistant Clinical Professor—R. R. Francis
Lecturer—G. N. Tucker
Instructor—F. D. Conroy
Sessional Instructor—L. L. Giroux

Honorary Members—The Honorable A. Blais, R. L. Anderson. G. N. Ellis, R. G. Huckell, N. E. Alexander, E. Greene

431. Surgery and Clinical Surgery (third year) (240 hours)

W. C. MacKenzie and Staff

(1) *Theatre Clinics*: Seventy-eight one-hour formal theatre clinics, fifteen of which are given jointly with other departments, will be presented throughout the year by the Department of Surgery, including the Surgical Specialities. These theatre clinics constitute the surgical contribution to the integrated course "Survey of Human Disease".

(2) *Clinics*: Six hours of clinical instruction per week on the wards of the University of Alberta and Royal Alexandra Hospitals will be provided by the Department of Surgery including the Surgical Specialties during the trimester the student is assigned to surgery.

(3) *Ward Work*: Sixteen hours of ward work per week will be carried out under supervision during the trimester the student is assigned to surgery.

441. Surgery and Clinical Surgery (fourth year) (356 hours)

W. C. MacKenzie and Staff

16 hours are devoted to a reading course in Surgery. The rest of the time takes the form of a 9 week clinical clerkship in the wards of various Edmonton Hospitals and in the outpatient department.

Textbooks: Davis, *Christopher's Textbook of Surgery,* 7th ed.; Dunphy and Botsford, *Physical Examination of the Surgical Patient,* 2nd ed.; Marshall, *Textbook of Urology,* 1st ed.; Shands, *Handbook of Orthopaedic Surgery,* 5th ed.; Compere and Banks, *Handbook of Fracture Treatment,* 4th ed.

Reference and Alternate Texts: Allen Harkins, Moyer and Rhoads, *Surgery Principles and Practice,* 1st ed.; Moseley, *Textbook of Surgery,* 3rd ed.; Watson-Jones, *Fractures and Joint Injuries* (2 volumes) 4th ed.

431. Ophthalmology (third year) (37 hours)

J. W. Duggan, R. W. Robertson

(a) One hour per week of clinics with patients (including demonstrations in the use of instruments and appliances).

(b) Clinical Ophthalmoscopy, bedside 2 hour clinics.

Textbooks: May's *Diseases of the Eye* (Keith and Lyle); May's *Diseases of the Eye* (Perera); Gifford's *Textbook of Ophthalmology* (Alder).

431. Otolaryngology (third year) (37 hours)

K. A. C. Clarke, T. C. Wilson, W. S. S. Armstrong

(a) One hour per week throughout the year consisting of 6 lectures and bedside clinics.

(b) Clinical Otolaryngology, bedside 2 hour clinics.

Textbooks: A. Logan Turner, *Diseases of Nose, Throat and Ear;* Ballenger, *Otology, Rhinology and Laryngology.*

441. Ophthalmology and Otolaryngology (fourth year) (34 hours)

Students on the trimester in Medicine will devote one week of their time to a clerkship in Ophthalmology and Oto-laryngology.

Academic Honors and Awards, M.D. Course

Fourth Year M.D.

Moshier Memorial Medal

1955 James Gilmour BEATTY
1956 Norma Eleanor Fallis HARRIS
1957 Kenneth Berton WIANCKO
1958 No Award
1959 David MacIndoo FAWCETT

Mewburn Memorial Gold Medal

1955 James Gilmour BEATTY
1956 Mario Isidoro TEDESHINI
1957 Orest Alexander ULAN
1958 William Alastair MCLEOD
1959 Richard William MALLEN

The Conn Memorial Medal

1955 Donald Martin DOWNIE
1956 William Robert BLACK
1957 Kenneth Berton WIANCKO
1958 Robert Calvin BURTON
1959 Richard William MALLEN

The Pope Memorial Medal

1955 David Ronald JOHNSTON
1956 Ronald Harvey WENSEL
1957 No Award
1958 Gordon Thomas FLETCHER
1959 Lois Ann STAYURA

Alberta Tuberculosis Association Prize

1955 Stephen Ian HNATKO
1956 Allan Keith CLEMENGER
1957 William SELEZINKA
1958 No Award
1959 No Award

Third Year M.D.

Scholarships of the College of Physicians and Surgeons of the Province of Alberta

1955 1st Norma Eleanor Fallis HARRIS
2nd Ronald Harvey WENSEL
1956 1st John M. SERBU
2nd Knut Egil VIK
1957 1st William Alastair MCLEOD
2nd Robert Calvin BURTON
1958 1st Donald MacIndoo FAWCETT
2nd Lois Ann STAYURA
1959 1st Lawrence Ardell HARKER
2nd Norman Edgar HAMILTON

The Harrison Memorial Scholarship in Obstetrics and Gynecology

1955 Norma Eleanor Fallis HARRIS
1956 Robert Franklin CLARK
1957 Hugh Fraser MORRISH
1958 Lois Ann STAYURA
1959 Kalmal Alexander Julius CSEUZ

The Prizes of the Associated Hospitals of Alberta
(Formerly the James MacDonald Taylor Prize)

1955 William Esmond BEAMISH
1956 Orest Alexander ULAN
1957 William Alastair MCLEOD
David McMahon GILMOUR
1958 (Surgery) David MacIndoo FAWCETT
(Medicine) Richard W. MALLEN
1959 (Surgery) John Nelson CHAPPEL
(Medicine) Lawrence Ardell HARKER

Second Year M.D.

Scholarships of the College of Physicians and Surgeons of the Province of Alberta

1955 1st Kenneth Berton WIANCKO
2nd Richard Stanton TENOVE
1956 1st Cameron Gordon STRONG
2nd Roman Marvin BALA
1957 1st David MacIndoo FAWCETT
2nd Lois Ann STAYURA
1958 1st Ervin LETWIN
2nd Lawrence Ardell HARKER
1959 1st Lawrence Edward BRYAN
2nd Gary Brewster STANFORD

Allan Coates Rankin Prize in Bacteriology

1955 Samuel Wallace LAWRIE
1956 Nicholas CHEPEHA
1957 Richard Nelson JOPLING
1958 Margaret Mizue SONODA
1959 Edward Carl BURCHAK

Ardrey W. Downs Prize in Physiology

1956 Roman Marvin BALA
1957 Lois Ann STAYURA

First Year M.D.

Scholarships of the College of Physicians and Surgeons of the Province of Alberta

1955 1st William Alastair MCLEOD
2nd Ormond James UPTIGROVE
1956 1st David MacIndoo FAWCETT
2nd Lois Ann STAYURA
1957 1st Leonard Edward SWISCHUK
2nd Arnold Silman MAEROV)
Margaret Mizue SONODA)—tied

1958 1st Joseph Boyd MARTIN
2nd Lawrence Edward BRYAN
1959 1st Joseph SHUSTER
2nd Robert John RAINE

Ardrey W. Downs Prize in Physiology

1957 Leonard Edward SWISCHUK
1958 Joseph Boyd MARTIN
1959 Robert John RAINE

Program Leading to the Degree of Bachelor of Science in Medical Laboratory Science

The University of Alberta offers a degree course in Medical Laboratory Science to men or women who may be interested in a career in Hospital Laboratory Technology.

The course is designed so that the student will serve a required period each summer in an approved hospital laboratory; it is expected that after completion of the second summer's work the student will be eligible to take the examinations of the Canadian Society of Laboratory Technologists and so become a Registered Technologist. He or she may then choose to obtain hospital employment and discontinue the course. The satisfactory completion of the third year of the course will make the student eligible for the degree of B.Sc. in Medical Laboratory Science.

The period of summer training will be in the laboratories of certain hospitals in Alberta. This training will be in the actual laboratory techniques as used in that hospital and will be under the supervision of the Director of Laboratory Services of the hospital concerned and the various technologists then employed in that laboratory. Eighteen weeks of hospital service will be required each summer.

Students will receive some remuneration from the hospitals for the summer periods.

Bursary aid from the Provincial Government will be available, for part of the course, to those students who have satisfactory academic records and are in need of such assistance. Bursaries will consist of fees for the two academic years, a living allowance (commencing January 1 of the first year) of $65 per month *while taking University classes* (not during the summers) and a book allowance of $25. Summer maintenance will be paid by the hospital in which the student trains.

In return for the Bursaries the recipients must put in 18 months of service in Hospital laboratories in Alberta. This return in service will commence at the time at which the recipient becomes eligible to take the C.S.L.T. examinations and must be completed before the recipient can return to the University to take the third year of her course, if she wishes to do so.

If, for any reason, the recipient is unable to make full return in service she will be expected to repay a portion of the bursary on a pro rata basis depending on the service already given. The summer training period taken in Hospitals is *not* considered return in service.

The awarding of bursaries is done by the Provincial Government and will depend on satisfactory scholastic standing. Permission to apply for a bursary does *not*

imply that a bursary will be awarded. The decision on each application is made by the Provincial Department of Health.

NOTE: Intending students should read also those earlier sections of this calendar dealing with requirements for admission, student advisory services, the dean of women, registration, fees, payment of fees, living accommodation, students' union, student medical services, regulations of the university, examination results, appeals, withdrawal of students, supplemental examinations.

Hospital Practice

Each student must take an approved period of hospital practice during the summers between first and second, and second and third years. Each summer term will be of 18 weeks duration. In every case the hospital concerned must be approved for this training by the Council of the Faculty of Medicine of the University of Alberta. Assignment to hospitals will be arranged by the office of the Dean of Medicine.

Examinations

Examinations will be held at the end of each academic year in all subjects given in that year and promotion to a subsequent year will depend on satisfactory completion of the present year.

Graduation

After successful completion of the full three year course the student will be eligible to graduate in the spring convocation. Of the courses taken for the B.Sc., students must obtain second-class standing, i.e., a mark of 65%, in no fewer than 6 courses, of which at least 4 are taken in the second and third years.

Outline of Courses

B.Sc. (M.L.S.) Program

FIRST YEAR

Subjects	Course No.	1st Term Lect.	1st Term Lab.	2nd Term Lect.	2nd Term Lab.
Modern Chemistry	Chem. 232	3	4	3	4
English	Engl. 200 or 210	3	0	3	0
Bacteriology	Bact. 201	2	3	0	0
Zoology	Zoo. 220	3	3	3	3
Clinical Pathology	Clin. Path. 361	1	2	1	2
Physical Education	P.E. 218 or 228	0	2	0	2

The first year University to be followed by 18 weeks summer experience and training in an approved hospital laboratory.

SECOND YEAR

Subjects	Course No.	1st Term Lect.	1st Term Lab.	2nd Term Lect.	2nd Term Lab.
Biochemistry	Biochem. 300	3	3	3	3
Clinical Biochemistry	Biochem. 400	2	3	2	3
Bacteriology	Bact. 361	3	3	3	3
Physics	Phys. 100 or 200	3	2	3	2
A or B option		3	0	3	0

Second year University to be followed by 18 weeks practical experience and training in an approved hospital laboratory. Students may leave the course after the second year to work for a year or more before entering the final year.

THIRD YEAR

Subjects	Course No.	1st Term Lect.	1st Term Lab.	2nd Term Lect.	2nd Term Lab.
Physiology	Phys. 360 or 361	3	3	3	0
Analytical Chemistry	Chem. 312	3	6	3	6
Special A or B course	(Psychology 212 recommended)				
An option					
An approved C option					

Details of Courses

(B.Sc. (M.L.S.) Program)

Bacteriology

201. Elementary Bacteriology (2-3; 0-0)

MEMBERS OF THE DEPARTMENT

Simple general bacteriology; the importance of bacteria in everyday life. Demonstrations and practical laboratory exercises.

361. Pathogenic Bacteriology (3-3; 3-3)

R. D. STUART, S. R. TOSHACH AND MEMBERS OF THE DEPARTMENT

The relation of bacteria, viruses, fungi and protozoa to disease. The isolation and identification of bacteria, pathogenic to man. A study of bacterial infections and of resistance and immunity. Some consideration will be given to comparative bacteriology.

Biochemistry

300. General Course (3-3; 3-3)

H. B. COLLIER, C. M. KAY AND MARY S. SPENCER

Open to students in Arts and Science with prerequisites Chemistry 35 or 40 or 230 and 39 or 250 or 42 or 350. The topics dealt with include; physico-chemical properties of protoplasm; chemistry of carbohydrates, lipids, proteins, enzymes; the physiological chemistry of digestion; respiration, excretion, intermediary metabolism, hormones, and nutrition.

Texts: Cantarow and Schepartz, *Biochemistry;* Harrow and Mazur, *Textbook of Biochemistry;* West and Todd, *Textbook of Biochemistry.*

400. Clinical Biochemistry (2-3; 2-3)

H. B. COLLIER AND E. T. PRITCHARD

Open to some students in Arts and Science with prerequisite Biochemistry 50 or 300. The topics dealt with in lectures and laboratory include: principles and use of instruments in clinical laboratories; acid-base and electrolyte metabolism; clinical chemistry of urine and blood; gastric analysis and various functional tests.

Reference texts: Hawk, Oser, and Summerson, *Practical Physiological Chemistry;* Bodansky and Bodansky, *Biochemistry of Disease;* Cantarow and Trumper, *Clinical Biochemistry;* Stewart and Dunlop, *Clinical Chemistry in Practical Medicine.*

Chemistry

232. Modern Chemistry (3-1S-3; 3-1S-3)

W. F. ALLEN, F. W. BIRSS, L. H. CRAGG

Lectures: Stoichiometry, atomic and molecular structure; nuclear structure; thermodynamics, and inorganic chemistry of important elements; elementary physical chemistry; synthetic organic chemistry; and biochemistry.

Textbook: Sienko and Plane, *Chemistry.*

Laboratory: Experiments in general chemistry including some organic chemistry, quantitative chemistry and semi-micro qualitative analysis.

Prerequisite: Chemistry 130 or 30 of High School or equivalent.

312. Quantitative Analysis (3-6; 3-6)

W. E. Harris

Lectures: Principles and methods of quantitative analysis.
Laboratory: Gravimetric, volumetric, colorimetric and electrometric methods of analysis.
Prerequisites: Chemistry 35 or 36 or 40 or 230 or 232.

English

200. First Course in English Literature (3-0; 3-0)

Members of the Department

A close study of representative masterpieces, with some attention to the historical development of English Literature. Essays and tests on the prescribed literature will be given to afford practice in setting down ideas in good English.
Texts: Chaucer, the General Prologue and selections from the *Canterbury Tales; Everyman;* Malory, selected tales; Marlowe, *Dr. Faustus;* Shakespeare, *King Lear;* Johnson, *Volpone;* Spenser, *The Faerie Queene,* Book One; Donne, selected poems; Milton, *Samson Agonistes, Ode on the Morning of Christ's Nativity, Lycidas;* Dryden, selected poems and *An Essay of Dramatic Poesy;* Congreve, *The Way of the World;* Pope, selected poems; Swift, *Gulliver's Travels;* Addison and Steele, essays; Fielding, *Tom Jones;* Johnson, *Preface to Shakespeare, Life of Pope;* Boswell, selections from *The Life of Samuel Johnson*; Vallins, *Good English.*

210. English Language and Literature (3-0; 3-0)

Members of the Department

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.
Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift *Gulliver's Travels* Rinehart); Shaw, *Saint Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Storeis;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

Pathology

361. Clinical Pathology (1-2; 1-2)

A course in Clinical Pathology designed for students in the Special B.Sc. and B.Sc.(M.L.S.) patterns. The lectures will be on the use and interpretation of laboratory methods as diagnostic aids. The laboratory periods will be designed to develop in the students a high degree of accuracy and reasonable speed in hematological and other clinical pathological procedures that are used in a modern hospital laboratory.

Physics

100. General Elementary Physics (3-2; 3-2)

K. Vozoff

Textbook: Burton, Grayson-Smith and Quinlan, *College Physics.*

200. General Physics (3-2; 3-2)

J. H. Harrold and G. L. Cumming

A general course in the fundamentals of physics, including mechanics, properties of matter, heat, sound, electricity and light. Illustrated by experiments.

Textbook: Kolin, *Physics.*

Physiology

360. Elementary Human Physiology (3-0; 3-0)

E. O. Hohn and Staff

This course comprises of the essentials of human physiology.

For students of Household Economics.

Prerequisites: Zoology 1 or 220, Chemistry 42 or 350.

Textbook: Guyton, *Functions of the Human Body.*

361. Elementary Human Physiology (3-2; 3-2)

E. O. Hohn, W. H. Cottle and Staff

For students of the senior years in Arts and Science.

Prerequisites: Zoology 1 or 220, Chemistry 42 or 350.

Lecture course is the same as 360 above.

Laboratory course provides experience in handling living tissues, and in certain basic physiological techniques. Credit must be obtained for laboratory work to allow credit for the course.

Textbooks: Guyton, *Function of the Human Body;* Bell, Davison and Scarborough, *Textbook of Physiology and Biochemistry;* 4th ed. The latter textbook is recommended for those students proceeding to advanced courses in Physiology and to students registered in Honors programs.

Zoology

220. Elementary Zoology (3-3; 3-3)

Staff of the Department of Zoology

Animal organization; comparative morphology and anatomy; essentials of histology, principal phenomena of distribution, behavior, ecology, development and reproduction; evolution, variation and heredity.

XVI

The School of Nursing

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

On September 28, 1923, the Board of the University of Alberta Hospital recommended to the Senate of the University of Alberta that a School of Nursing be constituted. In that year the new school was established under the Faculty of Medicine and offered two programs: a five-year program leading to the degree, Bachelor of Science in Nursing, and a three-year program leading to the Diploma in Nursing.

Until 1936 students completed the final year of the degree program at the Universities of British Columbia, Toronto or McGill. In 1937 Public Health Nursing was offered on this campus as one of the options in the final year. In 1946 a second option, Teaching and Supervision in School of Nursing, was made available.

A number of revisions have been made in the degree program. From 1923 through 1936 the students spent the first two academic years at university, the third and fourth at the hospital and the fifth year at university. There was a preliminary term of three months at the hospital at the close of the first academic session. The total time required in hospital was thirty months.

Students registering for the degree program in 1937 spent one academic year at university, thirty-one months in hospital and a final year at university.

From 1938 through 1951 the student spent one academic year at university, thirty-six months in hospital and a final year at university.

In 1951 the first year of the degree program was offered at the Calgary Branch of the University, as well as in Edmonton.

In September, 1952, the degree program was shortened to a four-year integrated course.

In September, 1952, a two-year program leading to the degree, Bachelor of Science in Nursing, was made available to registered nurses.

In May, 1954, at the request of the University of Alberta Hospital Board, the School of Nursing at the University of Alberta Hospital was placed under the jurisdiction of the Hospital Board and ceased to function under the Faculty of Medicine, University of Alberta.

In September, 1954, the degree course was changed to a five-year program. Through affiliation agreements, students could take the clinical portion of the curriculum at either the School of Nursing, Calgary General Hospital, Calgary, or at the School of Nursing, University of Alberta Hospital, Edmonton. The affiliation with the Calgary General Hospital was suspended from September 1960. Students now take the three clinical years, second, third and fourth at the University of Alberta Hospital School of Nursing.

Over the years a number of programs have been made available to graduate nurses. A one-year program leading to the Diploma in Public Health Nursing was instituted in 1937. The five months' course leading to the Certificate in

Advanced Practical Obstetrics was organized in 1943 and a one year program leading to the Diploma in Teaching and Supervision in Schools of Nursing was instituted in 1946.

Student Life and Welfare

Students registered in the first or final year of the degree program and post-graduate students make arrangements for their own living accommodation. The women's residence on the Edmonton campus, Pembina Hall, is available to a limited number. Application for reservations, accompanied by $10.00, should be forwarded to the Bursar, University of Alberta, in the early spring.

Students registered in the second, third and fourth years of the degree program are provided accommodation in the Nurses' Residence.

The University medical services at Edmonton and Calgary are available to post-graduate students and to students in the first and fifth years of the degree course.

The health services at the University of Alberta Hospital, Edmonton, provide medical services for students registered in the second, third and fourth years of the degree course.

Recreational facilities on the campus are available to all students.

Through a guidance program the staff seeks to assist students who have social, emotional and personal problems.

Professional counselling and guidance are available at the Student Counselling Service. The office of the Director, Dr. A. J. Cook, is in the Administration Building, Edmonton. There is a Counsellor in Calgary.

All students on admission are given aptitude and achievement tests.

Programs Offered by the School of Nursing

The University of Alberta School of Nursing offers the following basic and post-basic professional programs:

Undergraduate

A five-year program leading to the degree, Bachelor of Science in Nursing.

Graduate

A two-year program leading to the degree, Bachelor of Science in Nursing.
A one-year program leading to the Diploma in Public Health Nursing.
A one-year program leading to the Diploma in Teaching and Supervision in Schools of Nursing
A 5-month program leading to the Certificate in Advanced Practical Obstetrics.

Description of Programs

Basic Program Leading to the Degree of B.Sc. in Nursing

The general aim of the degree program is to prepare young women who will be competent to meet their responsibilities in the broad health program of their times.

The program of study is planned to utilize the scientific and liberal arts

courses of the University as a background on which to build professional competence.

The first year of the program may be taken at the University of Alberta in Edmonton or in Calgary.

The second, third and fourth years are taken at the School of Nursing, University of Alberta Hospital, Edmonton.

The fifth year is taken at the University of Alberta, Edmonton.

The program qualifies the student for first-level positions in hospital and public health fields.

Post-Basic Program Leading to the Degree of B.Sc. in Nursing

This program offers registered nurses the opportunity to qualify for the degree, B.Sc. in Nursing.

The program of study includes courses in the biological, physical, and social sciences, general education and nursing, qualifying the nurse for positions in Schools of Nursing and Public Health Agencies.

Program Leading to the Diploma in Public Health Nursing

The course is designed for registered nurses who wish to prepare themselves to function as staff nurses in official and voluntary public health agencies.

Program Leading to the Diploma in Teaching and Supervision in Schools of Nursing

The program is designed for registered nurses who wish to prepare themselves to function more effectively in administrative, supervisory and teaching activities.

Program Leading to the Certificate in Advanced Practical Obstetrics

The course provides a program of instruction and supervised clinical experiences for nurses who are interested in preparing for positions of responsibility in the field of obstetrical nursing.

General Fees

Applicable to the Degree Course (First and Final Years) and Diploma In Public Health or in Teaching and Supervision:

Students' Union: *	Edmonton	Calgary
General	$11.25	$15.25
Building Fund	10.00	6.00
University Athletic Board	7.00	7.00
	$28.25	$28.25

*Full particulars on these fees may be found in the Students' Union Handbook.

Applicable to the Diploma Course (First, Second and Third Years) and the Degree Course (Second, Third and Fourth Years):

	Edmonton	Calgary
Registration	8 8.00	$ 8.00
Students' Union	4.50	.....
	$12.50	$ 8.00

Applicable to the Certificate in Advanced Practical Obstetrics:

Registration	$ 4.00
Medical Services	6.00
	$10.00

Instruction Fees

Certificate Course (Advanced Practical Obstetrics):

Instruction	$50.00

(2) ADMISSION REQUIREMENTS

A.—Basic Program Leading to the Degree of B.Sc. in Nursing

Students from Alberta high schools seeking admission to the University will be required to present:

(a) a High School Graduation Diploma with

(b) "B" or higher standing in the following Grade XII examination subjects:

1. English 30,
2. Social Studies 30,
3. Chemistry 30.

4, 5 & 6. *Three* of:
Mathematics 30,
French 30 or German 30 or Latin 30,
Physics 30;
Biology 32;

(c) an average in these six courses of at least 60%.

NOTE: Students who completed Grade XII in 1954 or earlier will be given full consideration for admission. They are advised to write or see the Registrar of the University and to provide a complete transcript of their high school records.

B.—Post-Basic Program Leading to the Degree of B.Sc. in Nursing

Applicants must be registered nurses and present evidence of professional competence and the ability to carry and profit from postgraduate study. Students will normally be required to complete at least the year of specialization as a full-time intramural student of the School of Nursing, University of Alberta. Further requirements are:

1. Academic requirement outlined in "A" above.
2. Satisfactory clinical experience, including paediatric nursing, tuberculosis

nursing, and psychiatric nursing. Applicants must submit a transcript from their Hospital School of Nursing. Deficiencies in clinical experience will have to be made up and arrangements relative to length and type of experience are subject to the approval of the University.

C.—Program Leading to the Diploma in Public Health Nursing

D.—Program Leading to the Diploma in Teaching and Supervision in Schools of Nursing

E.—Program Leading to the Certificate in Advanced Practical Obstetrics

Applicants must be registered nurses and present evidence of professional competence and the ability to carry and profit from postgraduate study. Preference is given to applicants who meet the academic requirements outlined in "A" above.

Procedure for Admission

Undergraduate

A.—Basic Program Leading to B.Sc. in Nursing

1. Requests for application forms should be addressed to:
   Director, School of Nursing,
   Room 103, St. Joseph's College,
   University of Alberta, Edmonton.
2. The forms, when completed, should be returned to the above address. They are to be accompanied by (a) 3 recent photographs or snapshots, (b) a birth certificate, and (c) a letter, in the applicant's own handwriting, giving a brief account of her plans and aspirations for the future. The transcript of marks need not accompany the application forms but should be forwarded as soon as available.
3. As soon as the completed applications have been received, the University will contact the Hospital. The Hospital will then contact the applicant regarding a physical examination and interview. It is not necessary for the applicant to communicate with the Hospital until *after* she has received this letter.
4. The Director of the Hospital School of Nursing will forward to the School of Nursing, University of Alberta, a copy of the letter which has been sent to the applicant concerning the date for her physical examination and interview.

   The School of Nursing, University of Alberta, will then contact the applicant concerning an appointment for a interview.
5. When the physical examination and the interview are completed and the applicant has been assessed by the affiliating School, the Director of the Hospital School of Nursing will forward to the School of Nursing, University of Alberta, a copy of the letter of acceptance for the clinical years which has been sent to the applicant.

Graduate

B.—Post Basic Program Leading to the Degree of B.Sc. in Nursing

C.—Program Leading to the Diploma in Public Health Nursing

D.—Program Leading to the Diploma in Teaching and Supervision in Schools of Nursing

E.—Program Leading to the Certificate in Advanced Practical Obstetrics

1. Requests for application forms should be addressed to:
   Director, School of Nursing,
   Room 103, St. Joseph's College,
   University of Alberta, Edmonton
2. The forms, when completed, should be returned to the above address. They are to be accompanied by (a) one recent photograph or snapshot, (b) a letter, in the applicant's own handwriting, giving a brief account of her plans and aspirations for the future and (c) a transcript of High School Record, (d) Transcript of School of Nursing Record if graduate of Nursing outside Province of Alberta.
3. Students who do not meet the academic requirements for University entrance may be referred to Student Counselling Services prior to registration.
4. The Physical Examination (Page 4 of application form) must be completed by applicants for the program leading to a Certificate in Advanced Practical Obstetrics.

(3) PROMOTION AND GRADUATION

In addition to the information given below, students should read carefully the regulations concerning attendance, examinations, and promotions, found in Part I of this calendar, as these also are applicable to students in the School of Nursing.

1. Students who have not cleared their first year will not be permitted to register for the second year of the degree program.
2. First-year students with *one* supplemental will be allowed to start the second year of the degree program. Failure to pass the supplemental will result in their being asked to withdraw from the degree program.
3. First-year students with *two* supplementals will be required to clear at least one course at Summer School to entitle them to the privileges outlined for the student with one supplemental.
4. Students registered in the second, third, and fourth years of the degree program are subject to the regulations governing promotion and graduation as outlined in the calendar of the affiliating school.
5. Students registered in the final year of the degree program, in one of the one-year diploma courses, or in the certificate course must obtain an average of at least 65%. Three supplemental examinations for the purpose of raising the average may be granted. Which supplemental examination may be written will be decided by the Academic Staff of the School of Nursing.
6. Students who have unexcused absences totalling *one-eighth* of the total number of lectures in each course may be refused permission to write the final examination.

7. Field experience must be completed before a student will be recommended to General Faculty Council for the degree, diploma, or certificate for which she is a candidate.
8. No student registered in the post-basic program may proceed to the work of the next year without having completed satisfactorily the clinical experience as outlined in the calendar.

(4) PROGRAMS OF STUDY

NOTE: Except in Advanced Practical Obstetrics, the weekly hours of instruction for various courses are set out for both terms of the winter session. The letter "c" attached to a figure signifies clinic-hours, and the letter "s" seminar-hours. Otherwise, the first figure in each term indicates lecture-hours and the second laboratory hours.

A.—Basic Program Leading to the Degree of Bachelor of Science in Nursing

First Year

Chemistry 250
English 210 or English 200.
Nursing Education 231
Physical Education
Psychology 212 or Psychology 202,
Zoology 220
An approved Junior option from Division A, B, or C.

Second, Third and Fourth Years

Instruction and clinical practice are offered at the School of Nursing, University of Alberta Hospital, Edmonton.

Fifth Year

Students will be required to make a choice of a major field of interest: *either* Public Health Nursing *or* Teaching and Supervision in Schools of Nursing.

I—Public Health Nursing

1. Course and Number	Subject	Hrs. per wk.
P.H. 401	Health Supervision	(2-0; 0-0)
P.H. 403	Introduction to Social Work	(0-0; 2-0)
N.Ed. 450	Principles of Teaching Nursing and Health	(3-2; 0-2)
N.Ed. 451	Current Trends in Nursing	(0-0; 2-0)
Soc. 202	Sociology	(3-0; 3-0)
Ed. 475	Psychology of Learning	(3-0; 0-0)
P.H. 400	Public Health Nursing	(3-0; 3-2s)
P.H. 405	Maternal Health	(2-0; 0-0)
P.H. 407	Child Health	(0-0; 3-0)
P.H. 402	Epidemiology	(2-0; 1-0)
H.Ec. 405	Nutrition for Public Health Nursing	(1-0; 0-0)
N.Ed. 459	Introduction to Hospital Nursing Service Administration	(2-0; 0-0)

2. *Field Experience*

Observation and supervised experience in public health nursing is required

as part of the course. This is arranged to meet the individual needs of the students:

1. Concurrent field experience is included in a number of courses. Students spend *one half day* per week during the first term and *one and one-half days* per week during the second term observing and teaching in local health and social agencies.
2. Four weeks of full time field experience in selected health agencies following final examinations.

II—Teaching and Supervision

1. Course and Number	Subject	Hrs. per wk.
P.H. 401	Health Supervision	(2-0;0-0)
P.H. 403	Introduction to Social Work	(0-0; 2-0)
N.Ed. 450	Principles of Teaching Nursing and Health	(3-2; 0-2)
N.Ed. 451	Current Trends in Nursing	(0-0; 2-0)
Soc. 202	Sociology	(3-0; 3-0)
Ed. 475	Psychology of Learning	(3-0; 0-0)
N.Ed. 453	Hospital Nursing Service	(6-0; 0-0)
N.Ed. 455	Administration in Schools of Nursing	(0-0; 5-0)
N.Ed. 457	Curriculum Planning	(0-0; 2-5s)
P.H. 409	Public Health Nursing	(2-0; 0-0)

2. *Field Experience*

1. Concurrent field experience is included in a number of courses. Students spend *one half day* each week during the first term in observing in local health agencies. Observation and supervised practice in teaching, *one and one-half days* each week during the second term.
2. Four weeks of observation and supervised experience planned to meet the individual needs of each student following the final examinations.

B.—Post-Basic Program Leading to the Degree of Bachelor of Science in Nursing

First Year

Chemistry 250.
English 210 or English 200.
Physical Education.
Psychology 212 or Psychology 202.
Zoology 220.
An approved Junior option from Divisions A, B, or C.

Second Year

This is the same as the fifth year of the basic program.

C.—Program Leading to the Diploma in Public Health Nursing

I—Public Health Nursing, Fifth Year of the Basic Program, modified as follows:

1. N.Ed. 459 is replaced by
   Bact. 441. Bacteriology (1-3; 0-0)
2. For students who do not have adequate clinical experience in Psychiatry, an added two weeks of experience at the Provincial Mental Hospital may be arranged.

D.—Program Leading to the Diploma in Teaching and Supervision in Schools of Nursing

II—Teaching and Supervision, Fifth Year of the Basic Program, modified as follows:

1. P.H. 409 is replaced by
   Bact. 441. Bacteriology (1-3; 0-0)
2. For students who do not have adequate clinical experience in Psychiatry, an added two weeks of experience at the Provincial Mental Hospital may be arranged.

E.—Program Leading to the Certificate in Advanced Practical Obstetrics

Two courses in Advanced Practical Obstetrics will be conducted during the year:

August 29 to January 14
February 6 to June 24

1. Subjects:		Hrs. per wk. (10 weeks)
Principles of Obstetrics and Mechanisms of Labour	A.O. 35	3-0
The Care of the Obstetrical Patient	A.O. 35A	12-3c
Infant Care	A.O. 35B	1-0
Principles of Supervision and Teaching in Obstetrical Nursing	A.O. 35C	2-0

2. Clinical Experience:
   1. Concurrent supervised experience in the antepartum and postpartum care of patients and in the care of the normal premature infant. Fifteen hours each week during part one of the course.
   2. Eight weeks observation and supervised clinical experience in selected obstetrical units throughout the province. Each student must deliver, under medical supervision, a minimum of twenty cases during part two of the course.
   3. On satisfactory completion of the clinical experience the student returns for two weeks to the University where the course is summarized, case reports reviewed, and a written and oral examination conducted. This constitutes part three of the course.

(5) DETAILS OF COURSES

The University School of Nursing reserves the right to withdraw any of the courses here outlined.

Students are reminded that attendance is expected in all courses.

TEACHING STAFF—

Associate Professor—Ruth E. McClure (Director of the School)
Assistant Professors—Margaret M. Campbell, M. Patricia McMillan
Lecturers—Margaret M. Madden, Shirley M. Stinson
and—
Members of the Departments of Anatomy, Bacteriology, Chemistry, Dentistry, English, Household Economics, Medicine, Obstetrics and Gynaecology, Opthalmology and Oto-Laryngology, Paediatrics, Pathology, Pharmacy, Philosophy and Sociology, Psychology, Physical Education, Physiotherapy, Preventive Medicine, Psychiatry, Radiology, Surgery and Zoology.

Courses Given in First-Year Degree Program

(This year may be taken at the University in Edmonton or Calgary.)

CHEMISTRY

250. (39) Organic Chemistry (3-3; 3-3)

R. B. SANDIN, W. A. AYER

Lectures: An introduction to a study of the compounds of carbon.
Laboratory: The preparation of some organic compounds.
Textbook: Fieser and Fieser, *Organic Chemistry;* or Noller, *Textbook of Organic Chemistry.*
Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd ed.
Prerequisite: Chemistry 130 or 30 of High School or equivalent.

ENGLISH

200. (2) A First Course in English Literature (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

A close study of representative masterpieces, with some attention to the historical development of English literature. Essays and tests on the prescribed literature will be given to afford practice in setting down ideas in good English.
Texts: Chaucer, the General Prologue and selections from the *Canterbury Tales; Everyman;* Malory, selected tales; Marlowe, *Dr. Faustus;* Shakespeare, *King Lear;* Johnson, *Volpone;* Spenser, *The Fairie Queene,* Book One; Donne, selected poems: Milton, *Samson Agonistes, Ode on the Morning of Christ's Nativity, Lycidas;* Dryden, selected poems, and *An Essay of Dramatic Poesy;* Congreve, *The Way of the World;* Pope, selected poems; Swift, *Gulliver's Travels;* Addison and Steele, essays; Fielding, *Tom Jones;* Johnson, *Preface to Shakespeare, Life of Pope;* Boswell, selections from *The Life of Samuel Johnson,* Vallins, *Good English.*

210. (5S) English Language and Literature (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.
Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rinehart); Shaw, *St. Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

SCHOOL OF PHYSICAL EDUCATION

All first-year students are required to take two hours of physical education per week. Those excepted from this regulation are:

1. those declared unfit by the University Medical Services;
2. students over 25 years of age.

Individual lockers, locks, towels and shower facilities are available for all students. The program is conducted in the University Gymnasium.

The prescribed gymnasium costume is:
Shorts (dark green)
Sports blouse (white)
Socks (white)
Running shoes

Shorts may be purchased at the University Bookstore.

All first-year students are required to register in Physical Education.

Phys. Ed. 228. (2W) Recreational Activities (0-2; 0-2)

R. Anderson and Staff

Emphasis on the fundamentals of the following recreational activities: tennis, aquatics, badminton, volleyball, basketball, social dancing and golf. Course required of all first-year women.

PSYCHOLOGY

202. (40) An Introduction to General Psychology (3-0; 3-0)

A survey of problems, methods and principles in various fields of psychology.

212. (42)General and Developmental Psychology (3-0; 3-0)

A survey of problems, methods and principles in various fields of psychology, wtih particular emphasis on child, adolescent and adult development and behavior.

ZOOLOGY

220. (1) Elementary Zoology (3-3; 3-3)

Animal organization; comparative morphology; essentials of histology; principal phenomena of distribution, behavior, ecology, development and reproduction, evolution, variation and heredity.

Courses Given in the Second, Third and Fourth Years of the Degree Course

For details of courses, see calendar of the School of Nursing, University of Alberta Hospital, Edmonton.

Postgraduate Courses—The School of Nursing, St. Joseph's College

A.O.35. Principles of Obstetrics and Mechanisms of Labour (3-0)

Dr. J. Ross Vant, Dr. W. D. Frew, Dr. A. E. Gain

The physiology and management of normal and abnormal pregnancy; theory and management of labour and delivery; principles underlying the administration of anaesthesia and analgesia; gynaecological conditions; the menopause.

A.O.35A. The Care of the Obstetrical Patient (12-3c)

M. M. Madden

Lectures, tutorials and concurrent field experience in ante, intra and post-partum care.

A.O. 35B. Infant Care (1-0)

Dr. J. K. Martin

The care of the normal and premature infant during the neonatal period.

A.O. 35C. Principles of Supervision and Teaching in Obstetrical Nursing (2-0)

M. M. MADDEN

The principles of supervision and teaching; their application in nursing service and nursing education.

NURSING

N.Ed. 231. (31) Orientation to Nursing (2-0; 0-0)

R. MCCLURE AND STAFF

A series of discussions designed to give the beginning student a general concept of the field of nursing and the responsibilities and obligations of the individual who chooses this profession.

BACTERIOLOGY

441. (41) Bacteriology (1-3; 0-0)

S. R. TOSHACH AND M. E. WILLIAMS

The relation of bacteria to individual and community health. A study of infection and resistance in man and of methods of diagnosis and control of infectious disease.

EDUCATION

475. Psychology of Learning (3-0; 0-0)

W. B. DOCKRELL

Analysis of learning process; psychology of skills, memory, reasoning, and emotion.

HOUSEHOLD ECONOMICS

405. (62A) Nutrition for Public Health Nursing (1-0; 0-0)

A study of the application of Nutrition as it relates to Public Health.

NURSING EDUCATION

N.Ed. 450. (35) Principles of Teaching Nursing and Health (3-2; 0-2)

R. MCCLURE

Principles underlying the teaching-learning process; methods of directing learning, organization of materials of instruction. Health teaching as applied to the practice of public health nursing in the home, school, and health centres. Practice in public speaking and supervised teaching will be included.

N.Ed. 451. (36) Current Trends in Nursing (0-0; 2-0)

S. STINSON

A study of the progress and trends in professional nursing in the light of historical influences and present-day social developments.

N.Ed. 453. (37) The Hospital Nursing Service (6-0; 0-0)

M. P. MCMILLAN

Principles of organization and administration applied to selected departments of the hospital; principles, practices, and problems of ward management; supervision as it relates to the improvement of nursing.

N.Ed. 455. (38) Administration in Schools of Nursing (0-0; 5-0)

M. P. MCMILLAN

Principles of organization and administration as applied to schools of

nursing. Administrative functions related to students—recruitment and selection, housing, health; principles and techniques of guidance. Faculty. Financial and legislative controls. Records.

N.Ed. 457. (39) Curriculum Planning (0-0; 2-5S)

M. P. McMillan

Principles and methods of curriculum construction; aims, standards, sources, techniques; planning the program of studies; tests, analyses and interpretation of results.

N.Ed. 459 (40) Introduction to Hospital Nursing Service Administration (2-0; 0-0)

S. Stinson

Principles of organization, administration and supervision of Nursing services in hospitals as they relate to the improvement of nursing. (For B.Sc. students only.)

PUBLIC HEALTH

P.H. 400. (37) Public Health Nursing (3-0; 3-2S)

M. Campbell

Trends and developments in preventive medicine; the organization and administration of public health services; the role of the nurse in public health services; the fundamental principles of public health nursing. Observation and practice in selected community health agencies.

P.H. 401. (35) Health Supervision (2-0; 0-0)

S. Stinson and Guest Lecturers

A study of the health needs of adults, emphasizing health statistics and the social and economic aspects of disease.

P.H. 402. (41) Epidemiology (2-0; 1-0)

M. Campbell

A study of the factors concerned with the transmission of disease; methods of control and prevention of Communicable Disease in the community; the collection and interpretation of statistical data.

P.H. 403. (36) Introduction to Social Work (0-0; 2-0)

A discussion of the principles of social welfare and their application. Community resources available to the public health nurse in meeting the needs of patients and families.

P.H. 405. (38) Maternal Health (2-0; 0-0)

J. R. Vant and M. M. Hutton

A study of modern concepts of adequate maternity care with emphasis on prenatal care and the nurse's role in assisting in the provision of sound physical and emotional health of the mother and child.

P.H. 407. (39) Child Health (0-0; 3-0)

R. McClure

A study of modern concepts of adequate child care, with special emphasis on the nurse's role in assisting to establish a sound basis for physical and emotional development.

P.H. 409. (40) Public Health Nursing (2-0; 0-0)

S. STINSON

Principles of Public Health Nursing; the role of the nurse in Public Health services with emphasis on co-operation between Public Health and hospital services in the community.
(For B.Sc. students only.)

SOCIOLOGY

202. (40) Introductory Sociology (3-0; 3-0)

R. L. JAMES

The sociological study of society, social institutions, group behaviour, personality formation and social change.

XVII

The Faculty of Pharmacy

INFORMATION, REGULATIONS, COURSES

FACULTY OF PHARMACY

(1) OPPORTUNITIES IN PHARMACY

With the rapid advancement being made in medical science during the present century, pharmacy is becoming a more and more specialized profession. The responsibilities associated with the distribution of drugs and pharmaceutical preparations are constantly increasing as new therapeutic agents are developed. In addition, the importance in the community of the pharmacist as a counsellor on public health matters and as a source of scientific information of a general character is becoming better appreciated by the general public. Educational standards have been advanced to meet these increasing demands and ample scope is provided to the young man or woman who wishes to enter pharmacy as a career.

There is always a demand for well-trained pharmacists and never before have opportunities been so great in pharmacy and its many allied fields. The following are some of the avenues open to qualified pharmacists: as proprietors, managers, and prescription clerks in retail stores; as dispensers in hospital pharmacies; as pharmaceutical and research chemists in manufacturing plants; as manufacturers' or wholesalers' representatives.

Retail Pharmacy

Retail pharmacy continues to attract the highest proportion of graduates. Since pharmacy is both a profession and a business this unique combination offers a satisfying and rewarding opportunity for service. The expanding economy of the country, and of Alberta in particular, will continue to provide conditions favorable to success.

Hospital Pharmacy

The contribution which the pharmacist can make in the hospital is being more fully realized and his skills more adequately utilized. His duties include the dispensing of prescriptions, control of drugs and other stores and supplies, manufacture of drugs, preparations, parenteral solutions, etc., the compiling and organization of data on recent advances in pharmacy so as to act as an adviser to nurses and doctors on new developments.

Public Health Laboratories

Graduates in pharmacy are well qualified to fill positions in municipal, provincial and federal health laboratories.

Manufacturing Pharmacy

There are many openings in manufacturing firms for pharmacy graduates as pharmaceutical and research chemists. This is particularly true for those graduates who supplement their basic pharmaceutical education with advanced or specialized training. Many graduates, also, find interesting and useful posi-

tions as manufacturers' representatives. Association with such firms opens up the possibility of advancement to executive positions.

Research

Upon completion of his undergraduate work the capable student finds many possible avenues open to him for graduate work leading to advanced degrees. Such special training equips the student for gratifying positions in research and teaching.

Women in Pharmacy

There are many opportunities for women in pharmacy. They find a natural place in hospitals, medical clinics, and in the larger dispensaries. Also, an increasing number of women are entering the field of retail pharmacy.

QUALIFICATIONS FOR PRACTICE IN ALBERTA

As from June, 1944, the Alberta Pharmaceutical Association established the course leading to the degree of Bachelor of Science in Pharmacy as the minimum requirement for the license to practice Pharmacy in Alberta.

As this calendar goes to press, consideration is being given to the introduction of a new four-year program in pharmacy. It is therefore possible that students entering the Faculty of Pharmacy in September, 1960 may be obliged to spend four years before becoming eligible to receive their degree. The first of the four years has been tentatively inserted in the calendar at page 46.

The regulations governing the practice of Pharmacy in the Province of Alberta are set forth in the Alberta Pharmaceutical Association Act.

(2) MATRICULATION AND APPRENTICESHIP REQUIREMENTS

Students from the high schools of Alberta seeking admission to the Faculty of Pharmacy will be required to present:

(a) a high school diploma with

(b) "B" or higher standing in English 30; Social Studies 30; Mathematics 30; Chemistry 30; and any two of: Physics 30, Biology 32, French 30 or German 30 or Latin 30. (Physics is recommended as *one* of the two options.)

(c) an average in these courses of at least 60%.

Students who completed Grade XII in 1954 or earlier will be given full consideration for admission. They are advised to write or see the Registrar of the University and to provide a complete transcript of their high school records.

Candidates for the course in pharmacy were formerly required to complete twelve months of practical experience before entering the University. This requirement has been withdrawn. In order to register as a pharmacist with the Alberta Pharmaceutical Association a graduate must have completed 12 months of practical experience but this need not be served before college. Information concerning the regulations applying to pharmaceutical apprenticeship in Alberta may be obtained from the Registrar-Treasurer, Alberta Pharmaceutical Association, Suite 2, 118 - 5th Avenue, E., Calgary, Alberta.

Applications to enter the Faculty of Pharmacy should be submitted to the Registrar, University of Alberta, on or before the August date shown in the Academic Schedule.

These general regulations notwithstanding, the University may in its discretion refuse admission to any applicant.

(3) PROMOTION

The pass mark in examinations is 50%, but in all practical pharmacy courses the student must obtain a standing of at least 60% in the laboratory work of the course. Failure in the laboratory part of a pharmacy course constitutes failure in the course without supplemental privilege.

(4) PROGRAMS OF STUDY

First Year of Proposed New Four-Year Program

Subjects	Course No.	First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Botany	Bot. 202	2	4	...	...
Zoology	Zool. 225	...	...	3	3
Chemistry	Chem. 230	4	3	4	3
Organic Chemistry	Chem. 250	3	3	3	3
Introductory Pharmacy	Pharm. 210	3	...	3	...
	Pharm. 210 (Lab.)	...	3	...	3
Latin	Latin 205	1	...	1	...
English	Eng. 210	3	...	3	...
Physical Education	Phys. Ed.	...	2	...	2

First Year of Three-Year Program

Subjects	Course No.	First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Botany	Bot. 202	2	4	...	...
Zoology	Zool. 225	...	...	3	3
Chemistry	Chem. 230	4	3	4	3
Organic Chemistry	Chem. 250	3	3	3	3
Introductory Pharmacy	Pharm. 210	3	...	3	...
	Pharm. 210 (Lab.)	...	3	...	3
Pharmacognosy	Pharm. 214	...	...	2	...
	Pharm. 214 (Lab.)	...	...	...	2
Latin	Latin 205	1	...	1	...
English	Eng. 210	3	...	3	...
Physical Education	Phys. Ed.	...	2	...	2

Second Year of Three-Year Program

Subjects	Course No.	First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Pharmaceutical Analysis	Pharm. 320	1	...	1	...
	Pharm. 320 (Lab.)	...	3	...	3
Dispensing Pharmacy	Pharm. 322	2	...	2	...
	Pharm. 322 (Lab.)	...	3	...	3
Pharmaceutical Chemistry	Pharm. 323	3	...	3	...
Bacteriology	Bact. 320	2	3	1	3
Biochemistry	Biochem. 300	3	3	3	3
Physiology	Physiol. 361	3	3	3	...
Option*		...	...	...	...

*An approved course from Division A or Division B.

Third Year of Three-Year Program

Subjects	Course No.	First Term		Second Term	
		Lect.	Lab.	Lect.	Lab.
Accounting	Account. 402	3	...	3	...
Veterinary Science	Vet. Sci. 404	1	...	1	...
Biopharmacy	Pharm. 430	...	...	2	...
Pharmaceutics	Pharm. 432	2	...	2	...
	Pharm. 432 (Lab.)	...	3	...	3
Organic Pharmaceutical Chemistry	Pharm. 433	3	...	3	...
	Pharm. 433 (Lab.)	...	...	...	3
Pharmaceutical Administration	Pharm. 434	2	...	2	...
Advanced Pharmaceutical Analysis	Pharm. 435	1	...	1	...
	Pharm. 435 (Lab.)	...	3	...	3
Pharmacology	Pharmacol. 431	2	3	2	3
Option*		...	...	...	...

*One approved course from the following departments: Botany, Bacteriology, Biochemistry, Chemistry, Entomology, Zoology, Business Administration, and Physics.

(5) GRADUATE STUDY

Students may undertake graduate study in pharmacy leading to the degree of M.Sc. or Ph.D. Any students contemplating such work should discuss their programs with the Dean of the Faculty of Pharmacy. They should also familiarize themselves with the regulations and procedures laid down by the Faculty of Graduate Studies. These may be found in the calendar of the Faculty of Graduate Studies. A few of the more important regulations are summarized below:

1. Students planning to begin graduate work should make application, not later than the date set in the Academic Calendar, for admission to the Faculty of Graduate Studies. Applications should be addressed to the Dean, Faculty of Graduate Studies.
2. Students planning to continue graduate study are reminded that, in addition to completing regular registration forms, they must submit to the

Faculty of Graduate Studies a new program form showing the courses immediately to be taken and noting any changes in the original program of studies.

3. Students must register and pay the usual registration and other fees for the session in which they submit their theses.

(6) DETAILS OF COURSES

(Regular attendance is expected of all students in the Faculty of Pharmacy.)

NOTE: The weekly hours of instruction for both terms of the winter session are shown at the top of each course description. The first figure in each term indicates lecture-hours and the second laboratory-hours.

ACCOUNTING

402. (2) Accounting and Business Practice (3-0; 3-0)

J. D. CAMPBELL

The first section of the course is designed to introduce the student to the subject of accounting from the standpoint of the operation of a business. The various mechanics of the accounts will be examined and their application to specific conditions which might arise in the operation of a business. The relationship of accounting to the business operations will be stressed throughout with specific attention to the areas of costing, including standards, budgets and marginal analysis, internal control, income tax and statement analysis.

The second section of the course is designed to cover an analysis of the medium and small business from the standpoint of policy formation, organization, facilities, and techniques. Special attention will be directed to those areas which are applicable to the operation of the typical drug store indicating the interrelationship of the accounting tools with the management function.

BACTERIOLOGY

320. (20) Bacteriology (2-3; 1-3)

G. E. MYERS

An introduction to bacterial classification, metabolism and behaviour with emphasis on the practical application of this knowledge in human and animal disease. Special consideration will be given to disinfectants, chemotherapeutic agents and antibiotics and to the discussion of resistance and immunity. The laboratory course provides an introduction to bacteriological techniques, methods of sterilization, assay and control procedures in the production of antibiotics, disinfectants and biologicals. Prerequisite: Chemistry 130 or 230 and Botany 202 or Zoology 225.

BIOCHEMISTRY

300. (50) General Course (3-3; 3-3)

H. B. COLLIER, C. M. KAY AND MARY S. SPENCER

Open to second-year Pharmacy students with prerequisites Chemistry 230, 250 or 350 and corequisite Chemistry 310 or its equivalent.

The topics dealt with include physico-chemical properties of protoplasm;

chemistry of carbohydrates, lipids, proteins; enzymes; the physiological chemistry of digestion, respiration, excretion; intermediary metabolism, hormones, and nutrition.
Text: Harrow and Mazur, *Textbook of Biochemistry.*

400. (60) Clinical Biochemistry (2-3; 2-3)

H. B. Collier and E. T. Pritchard

The topics dealt with in lectures and laboratory include: principles and use of instruments in clinical laboratories; acid-base and electrolyte metabolism; clinical chemistry of urine and blood; gastric analysis and various functional tests.
Prerequisite: Biochemistry 300(50).
Text: Varley, *Practical Clinical Biochemistry.*
Reference Texts: Hawk, Oser, and Summerson, *Practical Physiology Chemistry;* Cantarow and Trumper, *Clinical Biochemistry;* Stewart and Dunlop, *Clinical Chemistry in Practical Medicine.*

BOTANY

202. General Elementary Botany (2-4; 0-0)

Staff

Basic features of plant growth, structure and reproduction. Special reference to plants of economic importance. Relation of plant life to human welfare. Brief survey of plant kingdom.

CHEMISTRY

230. (35) Inorganic Chemistry (4-3; 4-3)

S. G. Davis, G. R. Freeman, R. N. O'Brien and W. J. Wallace

Lecture: The fundamental concepts of chemistry as applied to the elements and their compounds.
Laboratory: The preparation of compounds, quantitative chemistry and semimicro qualitative analysis.
Textbook: Sisler, Vander Werf and Davidson, *General Chemistry.*
Prerequisite: Chemistry 130 or 30 of High School or equivalent.

250. (39) Organic Chemistry (3-3; 3-3)

R. B. Sandin

Lectures: An introduction to a study of the compounds of carbon.
Laboratory: The preparation of some organic compounds.
Textbook: Fieser and Fieser, *Organic Chemistry* or Noller, *Textbook of Organic Chemistry.*
Laboratory Manual: Fieser, *Experiments in Organic Chemistry,* 3rd ed.
Prerequisite: Chemistry 130 or 30 of High School or equivalent.

450. (52) Organic Chemistry (3-3; 3-3)

D. Darwish

Lectures: Continuation of the study of the aromatic and aliphatic compounds. General considerations and mechanisms involved in their reactions.
Textbook: Cram and Hammond, *Organic Chemistry.*
Laboratory: Preparation of some organic compounds.

Laboratory Textbooks: Gatterman and Wieland, *Laboratory Methods of Organic Chemistry,* and Fieser, *Experiments in Organic Chemistry.*
Prerequisites: Chem. 230 and 250 or 350.
Prerequisites or corequisites: Chem. 370 or 372.

ENGLISH

210. (5S) English Language and Literature (3-0; 3-0)

MEMBERS OF THE DEPARTMENT

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.
Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rinehart); Shaw, *Saint Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McLelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

LATIN

205. (5) Latin for Pharmacy Students (1-0; 1-0)

E. C. MAY

The basic grammar of Latin with studies in the vocabulary which forms the basis for pharmaceutical terms.

PHARMACY

STAFF:—
Professors—M. J. Huston (Dean of the Faculty), B. E. Riedel
Associate Professor—A. J. Anderson
Assistant Professors—J. C. Morrison, K. H. Palmer
Instructor—W. H. Sprague
Sessional Instructors—N. K. Barth, K. M. James, T. W. Kassian, W. W. Maday, D. E. Ritchie, R. R. Shears, J. Warchola

210. (11) Introductory Pharmacy (3-3; 3-3)

M. J. HUSTON

(a) Lectures: Pharmaceutical history, literature and terminology; apparatus and general principles and processes; metrology and pharmaceutical calculations; first aid.

(b) Laboratory: The practical application of the principles covered in the lectures.

Textbooks: Davis, *Bentley's Textbook of Pharmaceutics;* British Pharmacopoeia; Burlage, Burt, Lee, and Rising, *Introduction to Pharmacy;* Huston, *A Textbook of Pharmaceutical Arithmetic.*

214. (14) Pharmacognosy (0-0; 2-2)

K. H. PALMER

(a) Lectures: A study of the more important official and non-official drugs of vegetable and animal origin; their history, source, part used, structure, constituents, preparations, doses, actions and uses.

(b) Laboratory: Macroscopic and microscopic examination of crude drugs; chemical and physical tests for identity and purity of drugs and principles; exercises in preparation and presentation of reports.
Textbook: Trease, *Textbook of Pharmacognosy.*

320. (20) Pharmaceutical Analysis (1-3; 1-3)

K. H. PALMER

(a) Lectures: Physical and chemical methods of identification and analysis; viscosity, surface tension, optical activity, refractive index; limit tests; a study of fixed oils, fats, waxes, volatile oils, oleo-resins, etc.
(b) Laboratory: Physical and chemical tests for identity and purity of organic and inorganic drugs; gravimetric and volumetric assays; preparation and assay of certain standard pharmaceutical preparations; the use of the polarimeter, refractometer, viscometers, nesslerimeter, etc.; analysis of fixed oils, fats, waxes, volatile oils, oleo-resins, etc.
Textbooks: Bentley and Driver, *Textbook of Pharmaceutical Chemistry;* Jenkins, Christian, and Hager, *Quantitative Pharmaceutical Chemistry.*

322. (22) Dispensing Pharmacy (2-3; 2-3)

J. C. MORRISON

(a) Lectures: Methods of handling and compounding typical prescriptions; pricing, dispensing specialties.
(b) Laboratory: Extensive practice in the compounding and dispensing of type prescriptions.
Textbook: Jenkins, Franke, Brecht, Sperandio, *The Art of Compounding.*
Reference: Martin, *Husa's Pharmaceutical Dispensing,* 5th Ed.

323. (23) Inorganic Pharmaceutical Chemistry and Pharmaceutical Preparations (3-3; 3-0)

M. J. HUSTON AND A. J. ANDERSON

The first half of this course is a study of the chemical and pharmaceutical properties of the official and non-official inorganic substances used in medicine or used in the preparation of medicinals; nomenclature, methods or preparation and purification, storage; preparations, doses, actions and uses. The second half of this course is a study of the various forms in which medicinals may be presented for use, including official, non-official and commercial preparations.
Textbooks: Rogers, *Textbook of Inorganic Pharmaceutical Chemistry;* Edmunds and Gunn, *Cushny's Pharmacology and Therapeutics;* Davis, *Bentley's Textbook of Pharmaceutics;* Martin, *Husa's Pharmaceutical Dispensing,* 5th E.

430. (30) Biopharmacy (0-0; 2-0)

M. J. HUSTON AND B. E. RIEDEL

A lecture course dealing with the following topics: biological products; veterinary biological products; agents used in allergy; antibiotics; hormones; and vitamins.

432. (32) Pharmaceutics (2-3; 2-3)

A. J. ANDERSON

(a) Lectures: Dealing in a more advanced manner with prescription prob-

lems; vehicles and flavoring agents; emulsions and emulsifying agents; external preparations; incompatibilities, buffering and isotonicity; parenteral preparations; anti-oxidants and preservatives; manufacturing pharmacy; dental pharmacy; hospital pharmacy; cosmetics.

(b) Laboratory: Exercises in the techniques, equipment and materials of modern dispensing and manufacture; evaluation and selection of vehicles; use of emulsifying agents; preparation and evaluation of formulations in selected texts and journals; cosmetic preparations; manufacturing pharmacy with training in the formulation and machine processing of pharmaceutical preparations; supervised inspection trips.

Textbooks: Scoville, *The Art of Compounding;* Spalton, *Pharmaceutical Emulsions and Emulsifying Agents.*

References: Remington's *Practice of Pharmacy;* Lyman, *Pharmaceutical Compounding and Dispensing* (Lippincott's American Pharmacy Series 1949); Harry, *Cosmetics, Their Principles and Practice;* Martindale, *The Extra Pharmacopoeia;* The United States Dispensatory; Martin, *Husa's Pharmaceutical Dispensing,* 5th Ed.

433. (33) Organic Pharmaceutical Chemistry (3-0; 3-0)

M. J. Huston and K. H. Palmer

(a) Lectures: A study from the chemical and pharmacological point of view of the official and non-official organic substances of both synthetic and natural origin used in medicine or used in the preparation of medicinals; new remedies and pharmaceutical specialties, including current information relative to the composition, properties, uses and source of supply of the newer trade-marked preparations.

(b) Laboratory: The preparation of a report based on a literature search or an experimental problem; a synopsis of the report will be presented to the class.

Textbooks: New and Non-Official Drugs; Wilson and Gisvold, *Organic Chemistry in Pharmacy;* Gutman, *Modern Drug Encyclopedia and Therapeutic Index;* Fieser and Fieser, *Organic Chemistry.*

434. (34) Pharmaceutical Administration (2-0; 2-0)

W. H. Sprague and B. E. Riedel

A study of the factors involved in the successful conduct of the profession of pharmacy; pharmaceutical jurisprudence; toxicology; partnership; insurance; store location; arrangement and stock control; advertising and display; window dressing; personnel problems; salesmanship; merchandising; buying; the role of the pharmacist in the community; interprofessional relations.

435. (35) Advanced Pharmaceutical Analysis (1-3; 1-3)

B. E. Riedel

(a) Lectures: Advanced chemical and physical methods of analysis; the use of modern instruments of analysis; alkaloids, glycosides and other plant principles.

(b) Laboratory: Manufacture and analysis of pharmaceutical preparations; identification and isolation of plant principles; analytical

problems; practice in the use of instruments such as spectrophotometer, photoelectric colorimeter, titrimeter, photofluorometer, mobilometer, pH meters, etc.

Textbooks: Jenkins, Christian, and Hager, *Quantitative Pharmaceutical Chemistry;* Boltz, *Selected Topics in Modern Instrumental Analysis;* Willard, Merritt and Dean, *Instrumental Methods of Analysis;* Riedel, *Laboratory Manual.*

Graduate Courses

501. (101) Isotope Tracer Methodology (3-3; 0-0)

B. E. Riedel

Lectures: A study of the fundamental principles of radioactivity. The importance of radioisotopes in medicine, agriculture, industry and in research. Discussion of the problems and limitations in the use of radioisotopes as tracers. Instrumentation and analysis methods. Health and safety precautions.

Laboratory: Handling and preparation of radioisotopes for counting. Counting procedures. Tracer chemical and biochemical analyses.

Textbook: Kamen, M.D., *Radioactive Tracers in Biology,* (Academic Press Inc., New York, N.Y.)

502. (102) Radioisotopes (0-0; 3-3)

B. E. Riedel

Lectures: Application of radioactive isotopes to biochemical problems in research, diagnostic medicine, agriculture and industry.

Experimental procedures, application of methods of analysis, and criteria for evaluation of results.

Discussion of newer applications and methods reported in the literature.

Laboratory:

A practical project involving the use of one of the available radioactive isotopes in the field of interest to the student.

Prerequisite: Pharmacy 501.

PHYSICAL EDUCATION

First-year students are required to register in Phys. Ed. 218—Men or Phys. Ed. 228—Women.

Phys. Ed. 218. (1M) Recreational Activities (0-2; 0-2)

C. J. Drake and Staff

Emphasis on the fundamentals of the following recreational activities: Touch football, Borden ball, volleyball, badminton, basketball, tumbling, aquatics, and golf.

Course required of all first-year men.

Phys. Ed. 228. (2W) Recreational Actvities (0-2; 0-2)

Emphasis on the fundamentals of the following recreational activities: Tennis, aquatics, badminton, volleyball, basketball, social dancing and golf.

Course required of all first-year women.

PHYSIOLOGY AND PHARMACOLOGY

361. (61) Elementary Human Physiology (3-2; 3-2)

E. O. Höhn, W. H. Cottle and Staff

For students in the senior years in Arts and Science and Pharmacy. Lecture course comprises the essentials of human physiology. Laboratory course provides experience in handling living tissues and in certain basic physiological techniques. Credit must be obtained in laboratory work to allow credit for the course.

Textbooks: Guyton, *Function of the Human Body;* Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed.; the latter is recommended as a reference text.

Prerequisites: Zool. 225 and Chem. 250 (39 or 42).

431. (31) Pharmacology (3-3; 2-3)

C. W. Nash, C. N. Gillis and Staff

A course on the pharmacological action of drugs selected for their physiological and clinical significance. The course includes a study of basic pharmacological principles as applied to representative drugs having their primary actions on various organ systems of the body. Classes of drugs studied include general and local anaesthetics; hypnotics, sedatives and anticonvulsants; analgesics; central nervous system stimulants; autonomic and curariform drugs; histamine and antihistaminics; cardiovascular drugs; diuretics; heavy metals and their antagonists; haemostatic agents and anticoagulants.

Instruction is given in the form of lectures, demonstrations and laboratory exercises. A series of written reports, based on laboratory work, is required of each student.

Prerequisite: Physiology 361.

Textbooks: Goodman and Gilman, *The Pharmacological Basis of Therapeutics,* 2nd Edition; Drill, *Pharmacology in Medicine,* 2nd Edition; Grollman, *Pharmacology and Therapeutics,* 3rd Edition; Beckman, *Drugs, Their Nature, Action and Use; New and Non Official Remedies.*

VETERINARY SCIENCE

404. (4) Veterinary Science (1-0; 1-0)

J. G. O'Donoghue

Veterinary biologicals; general sanitary measures for control of animal and poultry diseases; review of deficiency ailments; prevalent animal diseases with reference to recent pharmaceutical preparations and biological products used in treatment and prevention; some common sporadic ailments of farm animals and their remedies.

ZOOLOGY

225. (4) Elementary Comparative Anatomy (0-0; 3-3)

Comparative anatomy of the vertebrates, with special reference to mammals; parasitic invertebrates; development and evolution.

XVIII

The School of Physical Education

INFORMATION, REGULATIONS, COURSES

INTRODUCTION

The School of Physical Education was organized under General Faculty Council in 1954. The degree course in Physical Education has been offered since 1950. The program originally led to the degree of Bachelor of Education in Physical Education, which has been superseded by the degree of Bachelor of Physical Education.

In addition to the three-year course leading to the degree of Bachelor of Physical Education, the School provides instruction in teaching methods in both health and physical education for students in the faculty of Education, conducts regular classes (required) for first-year students in all faculties, organizes and supervises an intramural program and acts in an advisory capacity for the intercollegiate athletic program.

The course is not offered at Calgary.

Students may undertake graduate study in physical education leading to the degree of Master of Science. The Calendar of the Faculty of Graduate Studies should be consulted.

Opportunities in Physical Education

Graduates with a degree in physical education are being employed in both the fields of recreation and physical education. The demand for qualified people in these fields continues to increase each year, far exceeding the supply.

Teacher Education

The School of Physical Education is responsible for courses in health and physical education offered to students in the Faculty of Education.

All first-year students registered in the Faculty of Education are required to enroll in:

Phys. Ed. 200 or 201 or 203 Physical Education.

Students in the B.Ed. (Elementary) and Junior Elementary (E) are required to enroll also in Phys. Ed. 295 Health Education.

Dress: The prescribed gymnasium costume is:

Women	*Men*
Shorts (dark green)	Shorts
Sports blouse (white)	T-shirts
Socks (white)	Socks (white)
Running shoes	Running shoes

The Service Program

It is the aim of the School of Physical Education to make a major contribution toward the physical, mental and social life of each student through instruction and participation in physical and recreational activities.

All first-year students are required to take two hours of physical education each week. Those excepted from this regulation are:

1. Students declared physically unfit by the University Medical Services,
2. Students over 25 years of age.

Individual lockers, towels and shower facilities are available for all students. The program is conducted in the University Gymnasium.

Dress: The required gymnasium costume is identical to the one outlined in the foregoing section, "Teacher Education".

For details of courses offered in the Service Program, see page 54.

The Intramural Program

The School of Physical Education, with the cooperation of the University Athletic Board, organizes and administers a comprehensive program of intramural sports. A primary purpose of the program is to encourage sportsmanship and friendly relations among the students of the University through athletic competition. Individual and group competitive sports for men and women include tennis, golf, track and field, cross-country running, basketball, hockey, volleyball, touch football, table tennis, swimming and figure skating. Facilities include gymnasia, a swimming-pool, outdoor playing fields and the University ice arena.

Intercollegiate Athletics

As a member of the Western Canada Intercollegiate Athletic Union, the University provides opportunities for men and women to compete in intercollegiate sports. Included in the activities for men are golf, tennis, cross-country, badminton, volleyball, basketball, hockey, wrestling, swimming and curling. Women compete in tennis, golf and badminton and hold two sports weekends with member universities. Basketball and curling are played during one weekend and volleyball, swimming and figure skating during the other.

MATRICULATION REQUIREMENTS FOR THE DEGREE COURSE

A high school diploma with "B" or higher standing and at least a 60% average in the following Grade XII courses:

(a) English 30,
(b) Social Studies 30,
(c) Chemistry 30,
(d) *Three* of: French 30, German 30, Latin 30, Physics 30, Biology 32, Mathematics 30.

NOTE: It is recommended that students planning to register in physical education elect to take Biology 32 as one of the three optional courses.

These general regulations nothwithstanding, the University may in its discretion refuse admission to any applicant.

PROGRAMS OFFERED IN THE SCHOOL OF PHYSICAL EDUCATION

(1) The Degree of Bachelor of Physical Education

First Year

1. Chemistry 250.
2. English 200 or 210 or 230.
3. Psychology 202 or 212.
4. Zoology 220.

5. Physical Education 243: Introduction to Physical Education.
6. Physical Education 205: Activity Course.
7. Physical Education 207: Activity Course.
8. Physical Education 211: Activity Course.
9. Physical Education 215: Activity Course.

Second Year

1. Physiology 361.
2. Physical Education 305: Activity Course.
3. Physical Education 307: Activity Course.
4. Physical Education 311: Activity Course.
5. Physical Education 315: Activity Course.
6. Physical Education 362: Human Anatomy and Kinesiology.
7. Physical Education 371: First Aid and Care of Athletic Injuries.
8. Physical Education 375: Tests and Measurements in Health and Physical Education.
9. Physical Education 389. Outdoor School.
10. Physical Education 392: School Health Education.
11. Two approved options from Division A, B, or C*.

NOTE:

*Division A subjects: Languages and Fine Arts.
Division B subjects: History and Political Economy.
Division C subjects: Science and Mathematics.

Third Year

1. Physical Education 401: Activity Course.
2. Physical Education 403: Activity Course:
3. Physical Education 405: Activity Course.
4. Physical Educaiton 407: Activity Course.
5. Physical Education 442: Organization and Administration of Health and Physical Education:
6. Physical Education 452: Community Recreation.
7. Physical Education 467: Preventive and Corrective Physical Education.
8. Physical Education 473: Physiology of Exercise.
9. Physical Education 482: Observation and Practice in Field Work.
10. Two approved options from Division A, B, or C.

Graduation Requirements

1. Two "seconds" to be secured in Physical Education 362, 392, 442, 452, or in each member of any pair from Physical Education 371, 375, 467, 473.
2. Two "seconds" to be secured in the Arts and Science courses of the second and third year.

(2) Teacher Education

The Major and Minor in Physical Education

MAJOR

1. Physical Education 209 - 243
2. Physical Education 212
3. Physical Education 324
4. Physical Education 392
5. Physical Education 442

MINOR

1. Physical Education 209 - 243
2. Physical Education 212
3. Physical Education 324

The Minor in Health Education

MINOR

1. Physical Education 392
2. Education 310
3. One other course in Physical Education

B.Ed. Students in the Elementary Route

Physical Education 200—Physical Education in the Elementary Grades.
Physical Education 295—School Health Education.

(3) Faculty of Education Students in the Junior Elementary (E) Program

Physical Education 203—Physical Education for Grades I to IX.
Physical Education 295—School Health Education.

(4) Credit Requirements for Special Certificates for Faculty of Education Students

Physical Education Certificate	Requirements for Certification
Junior	Phys. Ed. 200; 201 or 203; 209, 243, 295, 324.
Senior	Phys. Ed. 212, 442, plus the Junior Certificate.
Advanced	B.Ed. in Physical Education degree or B.P.E. degree and appropriate general certification up to and including the Grade XII level.

NOTE: Special subject certificates are issued to holders of the appropriate general teaching certificates. (Junior E, Standard E, Standard S, or Professional.) The latter control the grade level to which any teacher is licensed to teach.

(5) B.Ed. Programs for Graduates in Physical Education

Physical Education students seeking a teaching certificate will register for a fourth year under the following arrangement:

The following are basic courses for such students from which selection will be made for the various purposes and for various categories of students according to the schedule in Section VIII H of the Faculty of Education Calendar (B.A. or Equivalent Degree).

1. Education 280s or 288—Education Method.
2. Education 382—Observation and Student Teaching.

3. Education 462—Education Administration.
4. One of Education 308, 310, 478, or a suitable course approved by the Division of Educational Psychology.
5. Education 476—Education Psychology.
*6. One of Philosophy 240, 352, 354, 360. Philosophy 246 or 356 may be offered by Roman Catholic Students.
7. Education 492—Philosophy of Education.
8. An approved senior A, B, or C option in related fields.
9. An approved senior A, B, or C option in related fields.

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*If a philosophy course has been taken as an option, substitute another Arts and Science course.

Try to plan the program to include an academic major as well as a Physical Education specialty.

(6) Summer Session Courses in Physical Education

1. In the Summer Session of 1960 and alternate years, the following courses will likely be offered: P.E. 212 and P.E. 442.
2. In the Summer Session of 1961 and alternate years, the following courses will likely be offered; P.E. 243, P.E. 209 and P.E. 324.

GRADUATE STUDY

M.Sc. Programs for Graduates in Physical Education

The School of Physical Education offers a program leading to the Master of Science Degree. Well-equipped facilities are available for a limited number of graduate students. Graduate instruction is offered in the history, philosophy, and supervision of physical education, and the administration of recreation. See the calendar of the Faculty of Graduate Studies.

Course selection will be made in consultation with an adviser appointed by the Graduate Committee of the School of Physical Education. The basic outline includes the following: Physical Education 544, Physical Education 546, or Physical Education 552, Physical Education 577, three approved options in related fields, and a thesis.

DETAILS OF COURSES

NOTE: In the case of courses which are given throughout the winter session, the weekly hours of instruction are set out for both terms. The first figure in each term indicates lecture-hours and the second laboratory-hours. Even numbered courses are full courses; odd numbered courses are half courses.

Professors—L. Goodwin (Calgary), W. D. Smith, M. L. Van Vliet (Director of the School).

Associate Professors—Patricia L. Austin, A. W. E. Eriksson, H. J. McLachlin.

Assistant Professors—A. F. Affleck, J. F. Alexander, Ruby O. Anderson, Audrey M. Carson, C. J. Drake, G. Fracas, Mary P. Hendrickson, (Calgary) D. deF. Macintosh, S. Mendryk, M. R. F. Smith.

Lecturer—Elvira J. Frache.

Instructors—Shirley A. Duquette (Calgary), Doreen A. Gillingwater, M. I. Patricia McCleary.

B.P.E. Activity Courses For Men

205. Activity Course (0-3; 0-0)

A. F. Affleck

Theory, practice and teaching of soccer and volleyball.

207. Activity Course (0-3; 0-0)

A. Carson

Theory, practice and teaching of games of low organization and rhythmics.

211. Activity Course (0-0; 0-3)

H. J. McLachlin

Theory, practice and teaching of tumbling and apparatus for men.

215. Activity Course (0-0; 0-3)

A. F. Affleck

Theory, practice and teaching of aquatics with emphasis on fundamental skills and stroke techniques.

305. Activity Course (0-3; 0-0)

S. Mendryk

Theory, practice, teaching and coaching of basketball.

307. Actviity Course (0-3; 0-0)

P. Austin

Theory, practice and teaching of folk and social dance.

311. Activity Course (0-0; 0-3)

H. J. McLachlin

Theory, practice and teaching of tumbling and apparatus for men. Emphasis on class organization and teaching methods.

315. Activity Course (0-0; 0-3)

M. F. R. Smith

Advanced aquatics with emphasis on coaching techniques for competitive swimming and diving. Organization of swimming meets and special programs, water games and synchronized swimming. Minimum qualifications to include Red Cross Instructors' Certificate and the Bronze Medallion of the Royal Life Saving Society.

389. Outdoor School (80 hours)

W. D. Smith and Staff

Theory, practice and teaching of tennis, archery, golf, officiating, and Outdoor Education. Fundamental skills of touch football, borden ball, and speedball.

401. Activity Course (0-3; 0-0)

H. J. McLachlin

Theory, practice and teaching of track and field with emphasis on coaching techniques, organization and officiating of meets.

403. Activity Course (0-0; 0-3)

W. D. Smith

Theory, practice and teaching of badminton, curling and skiing.

405. Activity Course (0-0; 0-3)

C. J. Drake

Theory, practice, teaching and coaching of hockey and wrestling.

407. Activity Course (0-3; 0-0)

S. Mendryk

Theory, practice, teaching and coaching of football.

B.P.E. Activity Courses For Women

205. Activity Course (0-3; 0-0)

A. F. Affleck

Theory, practice and teaching of soccer and volleyball.

207. Activity Course (0-3; 0-0)

A. Carson

Theory, practice and teaching of games of low organization and rhythmics.

211. Activity Course (0-0; 0-3)

A. Carson

Theory, practice and teaching of gymnastics.

215. Activity Course (0-0; 0-3)

To Be Announced

Theory, practice and teaching of aquatics with emphasis on fundamental skills and stroke techniques.

305. Activity Course (0-3; 0-0)

R. Anderson

Theory, practice, teaching and coaching of basketball.

307. Activity Course (0-3; 0-0)

P. Austin

Theory, practice and teaching of folk and social dance.

311. Activity Course (0-0; 0-3)

A. Carson

Theory, practice and teaching of gymnastics. Emphasis on class organization and teaching methods.

315. Activity Course (0-0; 0-3)

P. Austin

Advanced aquatics with emphasis on coaching techniques for competitive swimming and diving. Organization of swimming meets and special programs, water games and synchronized swimming. Minimum qualifications to include Red Cross Instructors' Certificate and the Bronze Medallion of the Royal Life Saving Society.

389. Outdoor School (80 hours)

W. D. Smith and Staff

Theory, practice and teaching of tennis, archery, golf, officiating and Outdoor Education. Fundamental skills of field hockey.

401. Activity Course (0-3; 0-0)

A. CARSON

Theory, practice and teaching of track and field with emphasis on coaching techniques, organization and officiating of meets.

403. Activity Course (0-0; 0-3)

R. ANDERSON

Theory, practice and teaching of badminton, curling and skating.

405. Activity Course (0-0; 0-3)

P. AUSTIN

The study of techniques, improvisation and composition of modern dance.

407. Activity Course (0-3; 0-0)

P. AUSTIN

Comprehensive study of international folk dance.

B.P.E. Theory Courses for Men and Women

243. Introduction to Physical Education (3-0; 0-0)

M. L. VAN VLIET

A survey of the field of physical education, with emphasis on factual information directed toward the development of a scientific program of physical education. This course will include a brief study of the history of physical education as well as underlying philosophies.

362. Human Anatomy and Kinesiology (2-2; 2-2)

H. J. MCLACHLIN

Gross anatomy; the skeletal and muscular structure, the circulatory, digestive and neural systems and their functionings in activities relating to physical education. Analysis of complex movements, specialized skills and motor co-ordination in terms of the mechanics of skeletal and muscular movements.

371. First Aid and Care of Athletic Injuries (0-0; 1-2)

S. MENDRYK

Advanced first aid, with practical experience in massage, elementary physiotherapy and prevention and care of athletic injuries.

375. Tests and Measurements in Health and Physical Education (1-2; 0-0)

W. D. SMITH

Criteria for selection of tests and the place and potential use of measurement in fields of health and physical education. Study of current tests from both practical and theoretical standpoints. Use of tests in the administration of physical activity programs.

392. School Health Education (3-0; 3-0)

A. W. E. ERIKSSON

Background of health knowledge for the high school course, with emphasis on provincial and national health problems. Nutrition, sanitation and recent developments in the field of health. Personal health problems of the high school age group. School Health Services and organization. Methods used in health instruction.

442. Organization and Administration of Health and Physical Education (3-0; 3-0)

M. L. Van Vliet

An analysis of factors involved in planning, directing, staffing, co-ordinating, budgeting and reporting with respect to comprehensive junior and senior high school programs in health instruction, the required program, intramural sports and interscholastic athletics.

452. Community Recreation (3-0; 3-0)

A. F. Affleck

A study of the philosophy, principles and practices of recreation applied to problems of organization, administration and supervision on a local, provincial and national basis.

467. Preventive and Corrective Physical Education (1-2; 0-0)

P. Austin

A study of postural and functional defects in relation to posture and health. Theory and practice of corrective and preventive exercise adapted to individual needs.

Prerequisites: Phys. Ed. 392, 362.

473. Physiology of Exercise (0-0; 1-2)

To Be Announced

Physiological effects of muscular exercise, physical conditioning and training. Significance of these effects for health and for performance in activity programs.

Prerequisite: Physiology 361.

482. Observation and Practice in Field Work (0-3; 0-3)

P. Austin and W. D. Smith

Field work experience in practice teaching, coaching, officiating, recreation and intramural programs.

Arts and Science Courses in the B.P.E. Program

CHEMISTRY

250. Organic Chemistry (3-3; 3-3)

R. B. Sandin and W. A. Ayer

Lectures: An introduction to a study of the compounds of carbon.

Laboratory: The preparation of some organic compounds.

Textbooks: Fieser and Fieser, *Organic Chemistry,* or Noller, *Textbook of Organic Chemistry.*

Laboratory manual: Fieser, *Experiments in Organic Chemistry,* 3rd edition.

Prerequisite: Chem. 130 or Chem. 30 of High School or equivalent.

ENGLISH

200. A First Course in English Literature (3-0; 3-0)

Members of the Department of English

A close study of representative masterpieces, with some attention to the historical development of English literature. Essays and tests on the pre-

scribed literature will be given to afford practice in setting down ideas in good English.

Texts: Chaucer, the General Prologue and selections from the *Canterbury Tales; Everyman;* Malory, selected tales; Marlowe, *Dr. Faustus;* Shakespeare, *King Lear;* Jonson, *Volpone;* Spenser, *The Faerie Queene,* Book One; Donne, selected poems; Milton, *Samson Agonistes, Ode on the Morning of Christ's Nativity, Lycidas;* Dryden, selected poems and *An Essay of Dramatic Poesy;* Congreve, *The Way of the World;* Pope, selected poems; Swift, *Gulliver's Travels;* Addison and Steele, essays; Fielding, *Tom Jones;* Johnson, *Preface to Shakespeare, Life of Pope;* Boswell, selections from *The Life of Samuel Johnson;* Vallins, *Good English.*

210. English Language and Literature (3-0; 3-0)

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.

Texts: Shakespeare, *Antony and Cleopatra* (Ginn); Swift, *Gulliver's Travels* (Rinehart); Shaw, *Saint Joan* (Penguin); Milton (Crofts); *The Penguin Book of Canadian Verse; Twelve Poets* (Rinehart); Miller, *Death of a Salesman* (Compass); Dickens, *Great Expectations* (Heinemann); *The Rinehart Book of Short Stories;* MacLennan, *Barometer Rising* (McClelland and Stewart); *Harbrace College Handbook* (3rd or 4th edition).

230. English Language and Literature (3-0; 3-0)

English 230 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English. (Students who prefer a chronological or historical approach should take English 200).

Texts: *College Survey of English Literature* (Harcourt, 1951); Forster, *Passage to India;* Shakespeare, *Othello* (Kittredge); Hodges, *Harbrace College Handbook* (4th Edition, Harcourt Brace).

PHYSIOLOGY

361. Elementary Human Physiology (3-2; 3-2)

Members of the Department of Physiology

Prerequisites: Zoology 220 and Chemistry 250.

Lecture course is the same as Physiol. 360 (the essentials of human physiology).

Laboratory course, given in both terms, provides experience in handling living tissues and in certain basic physiological techniques. Credit must be obtained in laboratory work to allow credit for the course.

Textbooks: Guyton, *Functions of the human body,* 1959; Bell, Davidson and Scarborough, *Textbook of Physiology and Biochemistry,* 4th ed.; the latter is recommended as a reference text.

PSYCHOLOGY

202. An introduction to General Psychology (3-0; 3-0)

Members of the Department of Psychology

A survey of problems, methods and principles in various fields of psychology.

212. General and Development Psychology (3-0; 3-0)

A. J. B. Hough and P. Rempel

A survey of problems, methods and principles in several fields of psychology, with particular emphasis on child, adolescent and adult development and behaviour.

ZOOLOGY

220. Elementary Zoology (3-3; 3-3)

Members of the Department of Zoology

Animal organization; comparative morphology; essentials of histology; principal phenomena of distribution, behavior, ecology, development and reproduction; evolution, variation and heredity.

Graduate Courses in Physical Education

544. Current Problems in Physical Education and Recreation (3-0; 3-0)

M. L. Van Vliet

A review of the development of specialized areas in physical education and recreation. A case method study of organizational and administrative practices in various aspects of recreation and physical education.

546. Seminar in History, Principles and Philosophy of Physical Education (3-0; 3-0)

Physical Education Staff

History of physical education in its cultural settings. Designed to develop an understanding regarding the purposes and significance of physical education in modern life.

552. Administration of Recreation (3-0; 3-0)

Physical Education Staff

The administration of programs of recreation to include planning, organizing, directing, co-ordinating and controlling. Municipal, provincial and federal legislation governing recreation.

577. Research Methods in Health, Physical Education and Recreation (3-0; 3-0)

W. D. Smith

Methods, techniques and tools of research. A study of the various approaches to research areas in health, physical education and recreation with special reference to recent developments in the field of tests and measurements.

Physical Education Courses in the Service Program

(Required of all first-year students except those registered in the Faculty of Education,)

218. Recreational Activities (0-2; 0-2)

C. J. Drake and Staff

Emphasis on fundamental skills in the following recreational activities: volleyball, basketball, badminton, tumbling, touch football, borden ball, aquatics, and golf. Course required of all first-year men.

226. Physiotherapy Service Program (2-0; 0-2)

To Be Announced

This course will include rhythmics, gymnastics, active games and dancing, suitable for all age groups. It will also include swimming and water safety techniques with emphasis on their use in the treatment of patients. (For students in the School of Physical Therapy and Occupational Therapy.)

228. Recreational Activities (0-2; 0-2)

R. Anderson and Staff

Emphasis on fundamental skills in the following recreational activities: volleyball, basketball, badminton, dancing, tennis, aquatics, and golf. Course required of all first-year women.

Physical Education Courses for Faculty of Education Students

200. Physical Education in the Elementary Grades (1-2; 1-2)

A. Carson

The theory, practice and teaching of physical education in the primary and elementary grades. Activities will include games of low organization, story plays, simple team games, folk dancing, rhythmics, self-testing stunts, tumbling and pyramid building.

201. Physical Education for Grades VII to XII (0-2; 0-2)

A. F. Affleck, A. Carson, M. F. R. Smith

An introduction to the theory and practice of physical education in the junior and senior high schools. Theory will include the purposes of physical education, principles of efficient movement, principles of learning as applied to physical education, the organization of lesson plans, yearly programs, including intramural and interscholastic programs, and special events. Activities will include fitness and conditioning exercises, soccer, folk dance, apparatus, stunts and tumbling.

203. Physical Education for Grades I to IX (0-2; 0-2)

Physical Education Staff

An introduction to the theory and practice of physical education in the elementary and junior high school. Theory will include the purposes of physical education, principles of efficient movement, physiological principles of learning as applied to physical education, the organization of lesson plans, yearly programs and special events. Activities will include games of low organization, stunts and tumbling, rhythmics, social and folk (including square) dancing, volleyball, soccer and track and field.

209. Activity Course (0-0; 0-3)

P. Austin

Theory, practice and teaching of rhythmics, social and folk dancing, badminton and volleyball.

Prerequisite: Physical Education 201 or equivalent.

212. Activity Course (0-3; 0-3)

PHYSICAL EDUCATION STAFF

Theory, practice and teaching of football, basketball, tumbling and apparatus for men, and skating, basketball, tumbling and apparatus for women.

243. Introduction to Physical Education (3-0; 0-0)

M. L. VAN VLIET

A survey of the field of physical education, with emphasis on factual information directed toward the development of a scientific program of physical education. This course will include a brief study of the history of physical education as well as underlying philosophies.

295. School Health Education (2-0; 2-0)

A. W. E. ERIKSSON, J. FRACHE

Principles of teacher, pupil and classroom health. Interpretation of the health programs for the elementary and junior high schools.

324. Activity Course (0-3; 0-3)

PHYSICAL EDUCATION STAFF

Theory, practice and teaching of softball, archery, soccer, and track and field. Principles of officiating.

392. Health Education in Secondary Schools (3-0; 3-0)

A. W. E. ERIKSSON

Background of health knowledge for the high school course, wtih emphasis on provincial and national health problems. Nutrition, sanitation and recent developments in the field of health. Personal health problems of the high school age group. School health services and organization. Methods used in health instruction.

442. Organization and Administration of Health and Physical Education (3-0; 3-0)

M. L. VAN VLIET

An analysis of factors involved in planning, directing, staffing, coordinating, budgeting and reporting with respect to comprehensive junior and senior high school programs in health instruction, the required program, intramural sports and interscholastic athletics.

XIX

The School of Physical Therapy and Occupational Therapy

INFORMATION, REGULATIONS, COURSES

(1) INTRODUCTION

The present two year diploma program in Physical Therapy which was inaugurated in September, 1954—terminates with the graduating class of 1961. The Board of Governors of the University of Alberta have given their approval to a new three year diploma program in Physical Therapy and also the introduction of a new three year program in Occupational Therapy. These programs will be instituted in the fall of 1960.

This new School of Physical Therapy and Occupational Therapy is the first to be founded west of Toronto and is the newest of the four University schools in Canada. The training in rehabilitation procedures has been established to provide professional personnel, who, under the direction of the medical profession, will aid in the recovery and re-establishment of disabled people suffering from physical and mental disorders.

Licensing

A graduate from this institution will be qualified to serve in Provincial and General hospitals, Mental Institutions, Clinics, Armed Services and in private practice. He or she will be eligible to register with the parent Canadian professional organization and may expect reciprocity in England, the Commonwealth and the International organization in Physiotherapy and Occupational Therapy. Graduates intending to practise outside Alberta will have to comply with the local state or provincial licensing requirements regardless of their professional qualifications. Those planning to practise outside Alberta may seek further information from:

1. The Canadian Physiotherapy Association,
   64 Avenue Road, Toronto 5, Ontario.
   The Canadian Association of Occupational Therapy,
   331 Bloor Street West, Toronto 5, Ontario.
2. In England:
   The Chartered Society of Physiotherapy,
   Tavistock House (south),
   Tavistock Square, London, W. 1, England.
3. In the United States:
   The American Physical Therapy Association,
   1790 Broadway, New York 19, N.Y.
   The American Occupational Therapy Association,
   250 W 57th St.,
   New York, 19, N.Y.
4. Other countries:
   Information may be obtained from the Canadian Physiotherapy Association and Canadian Association of Occupational Therapy, Toronto.

Association Membership

The Canadian Physiotherapy Association and the Canadian Association of Occupational Therapy have special post-graduate internship requirements for diploma students from all Canadian Universities, and the graduate, although eligible to practise, will be required to make up these necessary hours under the direction of the professional body concerned before professional registration can be obtained.

Diploma Program In Physical Therapy and Occupational Therapy

The diploma program comprises a three year curriculum consisting of organized courses in the basic sciences of Anatomy, Physiology and Zoology, as well as English, Psychology, and professional courses in Medicine, Surgery, Electrotherapy and Rehabilitation procedures.

In the second year the student will be required to extern in approved Alberta institutions under the supervision of qualified physiotherapists and occupational therapists. Provision is made for the payment of an honorarium by the hospital or clinic where the students intern during the summer months.

The first two years of the three year program will be common to both classes of students whether they intend to practise Physical Therapy or Occupational Therapy. This has been done in order to give the student a more basic background as well as a realistic and practical approach to the overall field of rehabilitation. At the end of the summer internship in second year the student will decide which field she intends to pursue and will register in the fall of the second year in either Physical Therapy or Occupational Therapy.

Students wishing the combined diploma may register for a fourth year and take those professional subjects not offered in Physical Therapy or Occupational Therapy, as the case may be.

(2) **ADMISSION REQUIREMENTS**

A candidate for admission to the first year of the diploma course must have reached her eighteenth birthday on or before the 1st of October. Only under exceptional circumstances will a candidate be admitted over the age of 35 years.

Male students are accepted provided at least two are registered in the same year of the program.

Applicants will be required to submit a certificate of physical fitness from the attending physician within 6 months prior to admission. A student registered in first year will be required to have a chest x-ray and submit to a tuberculin test.

The applicant will be required to present a High School diploma or its equivalent to include "B" or higher standing in the following subjects:

English 30	Physics 30
Social Studies 30	Mathematics 30
Chemistry 30	Foreign language 30

The student must have an average standing of 60% or higher in these courses.

In the event that high school education was received outside of Alberta or was completed prior to 1954—documentary evidence of academic record should be submitted for comparison with the present Alberta requirements.

Candidates must have satisfactory personality and physique and must meet the health and physical requirements of the University Health Services for the course in Physical Therapy.

The course is limited to forty students per year. It is open on equal terms to applicants from Alberta and from outside the province. In all cases, preference will be given on the basis of academic standing.

Registration

Enrolment will take place during the week of September 19, 1960, and each applicant accepted for admission to the first year of the course will receive a card of admission which will indicate the day and time at which the applicant must attend at the University for registration.

A medical certificate form, which is obtained from the Registrar at the same time as the application form, must be completed and signed by the applicant's family physician and must accompany the application form when it is returned to the Registrar.

Uniforms

The student will be expected to provide two white uniforms, and a pair of white oxfords, to be purchased under the direction of the school. The student will also bring shorts, running shoes and bathing suit for the practical courses.

Educational and Clinical Facilities

Undergraduates in the first and second years of the two-year diploma course will receive instruction in the following institutions:

University of Alberta Hospital,
Workmen's Compensation Board Rehabilitation Clinic,
Cerebral Palsy Centre,
Royal Alexandra Hospital,
Oliver Mental Hospital,
Ponoka Mental Hospital,
Camsell Hospital and other approved hospitals in and outside the city of Edmonton.

During undergraduate internship in an approved institution, the student will receive from the institution an honorarium which is at present not less than $50.00 per month.

(3) REQUIREMENTS FOR PROMOTION AND GRADUATION

Students are subject to the regulations found elsewhere in this calendar.

Students will be promoted in terms of the following policies:

The Council, School of Physical Therapy and Occupational Therapy will review the records, in theory and practice, of students at the end of each academic year. Recommendation for promotion and graduation will be based on fulfilment of the following requirements:

1. A grade of at least 50% in each subject and an over-all average of 60%.
2. Satisfactory completion of the required number of hours in summer and winter hospital work.

A supplemental is granted in not more than two subjects provided the over-all average is 60%. The pass mark for supplemental examinations is 50% in all courses.

A student who fails in more than two subjects may be allowed to repeat her full year, but only on the recommendation of the Council of the School of Physical Therapy and Occupational Therapy. A second such failure permanently debars the student from further study towards the diploma.

For the purpose of reaching an average mark in the work of each year, a scheme for determining a weighted average has been adopted. A notice outlining the basis on which this is done will be posted during the session.

(4) PROGRAMS OF STUDY

OLD PROGRAM—Second and final year (1960-61 only).

(a) Winter session:
Administration and Organization.
Applied Anatomy 2.
Clinical Neuro Physiology 2.
Clinical Therapeutics 2.
Electrotherapy 2.
First Aid.
Hospital Practice 2.
Medicine and Surgery 2.
Occupational Therapy.
Remedial Exercises 2.
Speech Therapy 2.
Vocation and Social Rehabilitation.

(b) Summer Terms:
Hospital Practice 3.

NEW PROGRAM

First Year

Subject	Course No.	Hours
Anatomy	Anatomy 200	156
English	English 210	78
Rehabilitation	Rehabilitation 200	200
Psychology	Psychology 212	78
Zoology	Zoology 220	156
Physical Education	Physical Education 226	52
	Total	740

Second Year (Not offered, 1960-61)

Subject	Course No.	Hours
Applied Anatomy	Applied Anatomy 300	52
Electrotherapy	Electrotherapy 300	78
Hospital Internship	Hospital Internship 300	234
Medicine & Surgery	Medicine & Surgery 300	65
Occupational Therapy	Occupational Therapy 300	156
Physiology	Physiology 300	130
Psychiatry	Psychiatry 300	26
Remedial Exercises	Remedial Exercises 300	117
Hospital Externship		
	Total	858
	Hospital Externship 301	640
	Total	1498

Third Year (Not offered, 1960-61)

(a) **Physical Therapy**

Subject	Course No.	Hours
Applied Anatomy	Applied Anatomy 400	52
*Clin. Neuro-Physiology	Clin. Neuro-Physiology 400	52
*Clin. Therapeutics	Clin. Therapeutics 400	52
Electrotherapy	Electrotherapy 400	130
Hospital Internship	Hospital Internship 400	390
*Medicine & Surgery	Medicine & Surgery 400	52
Remedial Exercises	Remedial Exercises 400	234
*Speech Therapy	Speech Therapy 400	26
	Total	988

Third Year (Not offered, 1960-61)

(b) **Occupational Therapy**

Subject	Course No.	Hours
Applied Anatomy	Applied Anatomy 410	52
*Clin. Neuro-Physiology	Clin. Neuro-Physiology 400	52
*Clin. Therapeutics	Clin. Therapeutics 400	52
Hospital Internship	Hospital Internship 400	390
*Medicine & Surgery	Medicine & Surgery 400	52
Occupational Therapy	Occupational Therapy 400	340
Psychiatry	Psychiatry 400	52
*Speech Therapy	Speech Therapy 400	26
	Total	1016

*denotes subjects common to both divisions.

(5) DETAILS OF COURSES

NOTE: The hours of instruction per week for both terms of the winter session are shown at the top of each course description. The first figure in each term indicates lecture-hours and the second laboratory-hours. The letter "c" attached to a figure signifies clinic-hours and the letter "d" lecture-demonstration-hours.

Professor—J. R. Fowler
Assistant Professors—A. G. Faulds, Moyna J. Gordon, Nancy Rendell
Sessional Lecturer—M. T. F. Carpendale
Members of the Departments of Anatomy, English, Medicine, Nursing, Obstetrics and Gynaecology, Pathology, Physics, Physiology, Psychiatry, Psychology, Surgery and Zoology.

OLD PROGRAM

Second Year

Clinical Neuro-Physiology 2 (2c-0; 2c-0)

An introduction and appreciation of the neurophysiology and gross pathology of some of the common disease conditions referred to the Physical Medicine Department for treatment. This lecture series is to be supplemented by clinical patients and visual aids. Some of the disease conditions covered are: Hemiplegia, Chorea, Parkinson's Disease, Multiple Sclerosis, Amyotrophic Lateral Sclerosis, Syringomyelia, Anterior Poliomyelitis, Neuritides, Peripheral Nerve Injuries, Herpes Zoster, Neurasthenia, Hysterical Manifestations, Paraplegia, Quadriplegia.

Medicine and Surgery 2 (2-0; 2-0)

A continuation of first-year lecture series on specific problems, including, where possible, clinical patients. Special attention will be given to chest surgery, orthopaedic disabilities, plastic surgery, and diseases of circulatory, respiratory and abdominal conditions.

A series of ten lectures on obstetrics and gynaecology, including the physiological anatomy of pelvis and abdominal wall, physiology of gestation and labour, parturition with viewing of birth, complications arising from gestation and parturition. Gynaecological conditions for which physiotherapeutic conditions are used.

Winter Hospital Practice 2 (0-12c; 0-12c)

The second year student will attend twelve hours a week supervised clinics in the University Hospital and Workmen's Compensation Board Rehabilitation Clinic.

Summer Hospital Practice 3 560 hours in all

The summer session, from May to July inclusive, will be spent in approved hospitals as an interneship.

PHYSICAL THERAPEUTIC PROCEDURES

Clinical Therapeutics 2 (1-0; 1-0)

DIRECTOR AND STAFF

A continuation of first-year lecture series on the application of physical principles as utilized by the physiotherapists in the treatment of some of the commoner disease conditions seen in the Physiotherapy Department.

Applied Anatomy 2 (2-2c; 2-2c)

PHYSIOTHERAPY DEPARTMENT

A continuation of first-year lecture series on practical neuromuscular and skeletal anatomy. Also the identification by surface markings of some of the major structures and organs. This course will include the use of anatomical specimens.

Electrotherapy 2 (3-1; 3-1)

PHYSIOTHERAPY DEPARTMENT

Lectures and demonstrations are given on basic electronics, including high-frequency currents, i.e. ultra Sonic, short wave, and micro wave therapy as well as faradic, interrupted galvanic, and sinusoidal currents, along with techniques of application, risks, precautions, indications and contraindications.

Remedial Exercises 2 (4-4; 4-4)

Lectures and demonstrations are given on re-education of movement and remedial exercises in medical and surgical conditions, from the acute illness to full gymnasium activity. Particular stress will be given to the common disabilities; such as poliomyelitis, hemiplegia, spinal injuries, respiratory diseases, as well as pre- and post-natal training.

Speech Therapy 2 (0-0; 1-0)

A series of lectures will be given by a qualified therapist in the field. The course will include an introduction and orientation of speech therapy in the retraining of the disabled suffering from dysarthria, defective speech, and aphasia.

Administration and Organization 6 hours in all

PHYSIOTHERAPY DEPARTMENT

Lectures are given on organization and administration of a department, the order and care of equipment and supplies and the keeping of records.

First Aid 7 hours in all

ST. JOHN AMBULANCE

There will be a series of seven lectures given by the St. John Ambulance in simple procedures in first aid.

Vocational and Social Rehabilitation 10 hours in all

CITY SOCIAL SERVICE OFFICERS

A survey of vocational services, rehabilitation services for the physically disabled and rehabilitation procedures for the physically handicapped. The part played by social workers in social problems will be discussed.

Occupational Therapy 26 hours in all

A REGISTERED OCCUPATIONAL THERAPIST

Lectures on the history, development and scope of occupational therapy and an introduction to the field of occupational therapy as it applies to rehabilitation programs in the field of psychiatry, medicine, paediatrics, and traumatology.

NEW PROGRAM

First Year

Anatomy 200(1) (6d-0; 6d-0)

Lectures and demonstrations covering the microscopic and gross structures of the human body, and study periods on prepared specimens; emphasis upon the skeletal, muscular and nervous systems.
Textbook: Cates and Basmajian, *Primary Anatomy.*

English 210 (3-0) (3-0)

English 210 is designed to increase appreciation of good literature and to afford practice in setting down ideas in good English.

Physical Education 226 (0-2; 0-2)

This course will include rhythmic gymnastics, active games and dancing suitable for all age groups. It will also include one term on swimming and water safety technique with emphasis on its use in the treatment of patients.

Psychology 212 (3-0; 3-0)

MEMBERS OF THE DEPARTMENT OF PSYCHOLOGY

A survey of problems, methods and principles in several fields of psychology, with particular emphasis on child, adolescent and adult development and behaviour.

Rehabilitation 200 (2-6; 2-6)

MEMBERS OF THE SCHOOL STAFF

An introduction to the basic principles of physical and occupational therapies which will include:

(a) A 78 hour practical course in the application of massage techniques particularly in relation to rehabilitation; which will include the identification of anatomical structures by palpation and the theoretical basis for the use of soft tissue manipulation in medical and surgical conditions.

(b) A 52 hour series of lecture and practical instruction periods in kinesiology and its application to body movement.

(c) A 3 hour lecture laboratory instruction to include the history, and development of Occupational Therapy and its present day role in rehabilitation. The first year will include instruction in the use of simple craft work in the restoration of movement in some medical and surgical conditions.

(d) Also, seven hours instruction will be given in simple First Aid procedures.

(e) and field trips will be arranged to introduce the student to Rehabilitation departments in the city.

Zoology 220 (3-3; 3-3)

MEMBERS OF THE DEPARTMENT OF ZOOLOGY

Animal organization, comparative morphology and anatomy, essentials of histology, principal phenomena of distribution, behaviour, ecology, development and reproduction, evolution, variation and heredity.

Second Year

Applied Anatomy 300 (1-1; 1-1)

Members of the School Staff

A review of basic anatomy taught in first year with particular emphasis on surface anatomy with identifications of anatomical structures by inspection, palpation and movement, as it applies in the fields of physical and occupational therapy.

Text: *Muscle Testing*—Daniel, Williams & Worthingham.

Electrotherapy 300 (1-2; 1-2)

Members of the School Staff

An introduction to the basic physical principles in electricity as it applies to physical therapy technique. This will include practical laboratory student participation in the application of simple procedures with direct and low frequency currents. Also the use of heat radiation in different diseases including the physiological effects, indications and contra-indications in each case.

Text: Clayton, *Electrotherapy and Actinotherapy,* III Edition.

Hospital Internship 300 (0-9d; 0-9d)

Rehabilitation Departments

Nine (9) hours a week will be spent in the Occupational and Physiotherapy departments of the University Hospital and/or other approved institutions in Edmonton, where qualified teaching personnel are available. This will be an introduction to the practical application of rehabilitation techniques on patients suffering from various physical and mental diseases.

Hospital Externship 301 640 hours in all

Members of School Staff and Institutional Staffs

Four months practical experience will be spent in the summer at approved institutions in the Province of Alberta. The students will be required to spend two (2) months of this time at one of the Provincial Mental Hospitals and the second two (2) months will be spent in an approved Physiotherapy department.

Medicine and Surgery 300 (3-0; 2-0)

Members of the Departments of Medicine and Surgery

A series of introductory lectures on the commoner diseases met with in the Rehabilitation department, which will include:

(a) Medical conditions:
1. Arthritides
2. Cardio vascular disease
3. Metabolic disease

(b) Orthopaedic Problems:
1. Traumatic conditions in bone, joint and muscle
2. Diseases of skeleton and orthopaedic disabilities
3. Orthopaedic approach to Poliomyelitis

(c) General surgical conditions:
1. Chest pathology
2. Abdominal pathology
3. Surgical neurology

(d) Gross Pathology:
A series of fifteen lectures to include inflammation, repair, degeneration, as well as surgical and medical pathology. This course will include microscopic slides.

Occupational Therapy 300 (2-4; 2-4)

MEMBERS OF THE OCCUPATIONAL DIVISION

A continuation of Rehabilitation 200 with the introduction of further craft work as applied in the treatment of psychiatric illness and physical disabilities. Special emphasis will be placed on the training of patients in mastering activities of daily living in keeping with their disability.

Physiology 300 (1) (3-2; 3-2)

MEMBERS OF THE DEPARTMENT OF PHYSIOLOGY

An elementary course in human physiology, oriented where possible towards physiotherapy. Emphasis is placed upon the mechanisms of control and normal function in the major systems of the body.
Texts: Zoethout and Tuttle, *Textbook of Physiology* or Carlson and Johnson, *Machinery of the Body*. (It is recommended that the student consult with the instructor before purchase of a textbook).

Psychiatry 300 (0-0; 2-0)

MEMBERS OF THE DEPARTMENT OF PSYCHIATRY

An introduction to current views and concepts of psychiatric illness and to include the history of the development of psychiatry. The course will also include the causes of mental illness; i.e. heredity, congenital, infections, endocrinological, traumatic and degenerative diseases.
An appreciation of the behaviour and signs seen in some common mental illnesses.
A general knowledge of the principles of modern treatment, including the importance of an occupational program.
One lecture will be concerned with the laws and rules pertaining to admissions, control and treatment of voluntary and non co-operative patients.

Remedial Exercises 300 (3-2; 2-2)

Lectures and practical classes are given on the theory of movement and body mechanics in the normal person and in the commoner pathological conditions, and in the prevention and correction of these by specific remedial exercises; the theory and practice of relaxation and suspension exercises, resistive exercises, and modern rehabilitation, along with functional rehabilitation and selfcare.
Also lectures and demonstration on methods of re-education of disabilities under water, to include whirlpool baths, Hubbard tank, contrast bath, paraffin bath and spa therapy.
One hour a week will be devoted to swimming instruction.

A series of 13 lecture demonstrations will be given by the School of Nursing on sterile techniques.
Textbooks: Cash, *A Textbook of Medical Conditions for Physiotherapy;* Cash, *Physiotherapy in Some Surgical Conditions.*

Third Year

On returning to the University for the final year, the students will then register in the division of their choice.

NOTE: Subjects listed in either division and marked with an asterisk will be common to both therapies.

(a) **PHYSICAL THERAPY**

Applied Anatomy 400 (1-1; 1-1)

MEMBERS OF THE PHYSIOTHERAPY DIVISION

For description, see old program (Anatomy 2)
Textbook: Gray's or Cunningham's *Anatomy.*

***Clinical Therapeutics 400** (2d-0; 2d-0)

J. R. Fowler, M.D., *Director of the School*
M. Carpendale, M.D., *Director of Rehabilitation, University Hospital*
The medical application of physical principles and rehabilitation techniques for disabled people.

***Clinical Neuro-Physiology** (2d-0; 2d-0)

MEMBERS OF THE DEPARTMENT OF MEDICINE

For description, see old program (Neuro-Physiology 2)

Electrotherapy 400 (3-2; 3-2)

MEMBERS OF THE PHYSICAL THERAPY DIVISION

For description, see old program (Electrotherapy 2)

Hospital Internship 400 (0-15c; 0-15c)

This will be a continuation of practical training at the University Hospital and other approved institutions.

***Medicine and Surgery 400** (2-0; 2-0)

MEMBERS OF THE DEPARTMENTS OF MEDICINE AND SURGERY

For description, se eold program (Medicine and Surgery 2)

Remedial Exercises 400 (3-6; 3-6)

MEMBERS OF PHYSIOTHERAPY DIVISION

Lectures and demonstrations are given on re-education of movement and remedial exercises in medical and surgical conditions, from the acute illness to full gymnasium activity. Particular stress will be given to the orthopaedic conditions and common disabilities; such as poliomyelitis, hemiplegia, spinal injuries, respiratory diseases, as well as pre- and post-natal training.

***Speech Therapy 400** (0-0; 2-0)

QUALIFIED SPEECH THERAPIST

For description, see old program (speech Therapy 2)

(b) **OCCUPATIONAL THERAPY**

Applied Anatomy 401 (1-1; 1-1)

MEMBERS OF THE OCCUPATIONAL THERAPY DIVISION

A practical course in the study and evaluation of anatomical movement in relation to functional daily activities.

***Clinical Therapeutics 400** (2d-0; 2d-0)

J. R. Fowler, M.D., *Director of School*
M. Carpendale, M.D., *Director of Rehabilitation, University Hospital*
The medical application of physical principles and rehabilitation techniques for disabled people.

***Clinical Neuro-Physiology 400** (2d-0; 2d-0)

MEMBERS OF THE DEPARTMENT OF MEDICINE

For description, see old program (Neuro-Physiology 2)

Hospital Internship 401 (0-15c; 0-15c)

MEMBERS OF DEPARTMENT AND HOSPITAL REHABILITATION STAFF

The third year student will attend 15 hours a week at supervised clinics at the University Hospital and other approved institutions in the Edmonton area.

***Medicine and Surgery 400** (2-0; 2-0)

MEMBERS OF THE DEPARTMENT OF MEDICINE AND SURGERY

For description, see old program (Medicine and Surgery 2)

Occupational Therapy 400 (4-9; 4-9)

This course will include special practical training in suitable occupational activities for the physical disabled and also the training of the upper extremity amputee. It will include progressed activities which will particularly benefit the psychiatric patient in keeping with the rate of mental recovery.

A series of lectures will be given in department management.

Psychiatry 400 (2d-0; 2d-0)

MEMBERS OF THE DEPARTMENT OF PSYCHIATRY

The lectures in this subject will include specific psychiatric diseases and the present day methods of treatment, including the role of occupational therapy. These lectures will be supplemented by clinical examples. The student will be required to follow a particular case under psychiatric direction and present a complete case history and the patient's response to treatment.

***Speech Therapy** (0-0; 2-0)

QUALIFIED SPEECH THERAPIST

For description, see old program (Speech Therapy 2).

XX

The Faculty of Graduate Studies

THE FACULTY OF GRADUATE STUDIES

Graduate work has been offered at the University of Alberta since its inception in 1908. During recent years the numbers of graduate students have increased rapidly, particularly in the programs leading to doctoral degrees. The present organization of the Faculty with a Dean was adopted in 1957.

The degrees offered by the Faculty are the Master of Arts, Master of Education, Master of Science, Doctor of Education and Doctor of Philosophy. All of these are based on programs of study including a thesis project. The Doctor of Letters and Doctor of Science degrees are awarded for outstanding achievement in the humanities or sciences. In 1959 the degrees awarded included 15 M.A., 27 M.Ed., 46 M.Sc., 8 Ph.D., and 1 D.Sc. There were 581 students registered in the Faculty in 1959-60.

The University has continually expanding facilities for advanced study and research, and a steadily growing staff to provide direction in graduate programs.

PROGRAMS IN THE FACULTY OF GRADUATE STUDIES

The Faculty of Graduate Studies administers programs leading to the degrees of Master of Arts, Master of Education, Master of Science, Doctor of Education, and Doctor of Philosophy, and makes recommendations for granting the degrees of Doctor of Science and Doctor of Letters.

Graduate students are admitted to the Faculty in one of the following categories:

1. *Candidate for a master's degree.*
2. *Provisional candidate for a doctor's degree*:
   All Ph.D. and Ed.D. students are admitted as provisional candidates for at least the first year of the program.
3. *Provisional graduate student* is one whose university record is either: (a) difficult to assess (e.g. some foreign students) or (b) below the standard normally required.
4. *Conditional graduate student* is one who is required to take undergraduate courses prerequisite to, and in addition to, the graduate program. Fees for such courses are not included in graduate program fees.
5. *Special graduate student* is one who wishes to take graduate courses for purposes other than degree credit at this university.

Graduates in Medicine who are proceeding with a program of clinical training, leading to the examination of the Royal College of Physicians and Surgeons of Canada, and who are registered in the Graduate Training Program of the Faculty of Medicine shall also be registered in the Faculty of Graduate Studies as special graduate students. Inquiries should be made to the office of the Dean of Medicine.

The Faculty of Graduate Studies is administered by a Dean and a Council representative of the departments offering graduate work. Inquiries should be addressed to the Dean, Faculty of Graduate Studies.

The general regulations apply to all graduate students. Additional requirements are outlined under the headings: "Master's Degree", "The Degree of Doctor of Philosophy", "The Degree of Doctor of Education", and "The Degrees of Doctor of Science and Doctor of Letters".

GENERAL REGULATIONS

Qualifications for Admission

The requirements for admission to candidacy for a degree are:

(a) a baccalaureate degree or its equivalent with an average mark of at least 65% in the work of the last two undergraduate years, and

(b) a statement from the head of the department concerned to the effect that the applicant is, in all respects, acceptable to the department.

Applicants should recognize that graduate work differs from undergraduate study in that it requires, in addition to formal course work, initiative and persistent industry directed toward a research project.

Should there be some question regarding academic competence or adequacy of preparation in the proposed field of study, an applicant may be accepted as a provisional graduate student. If, after the completion of one academic year, he has proven his competence or acquired basic training to the satisfaction of the department and the Faculty, he may be accepted as a candidate for a degree. If accepted, he may apply to the Faculty to have courses (other than required preparatory courses) completed during his status as provisional graduate student credited toward the requirement for a degree. Each such application will be considered on its individual merits. Special graduate students are not considered as candidates or potential candidates for a degree.

Application for Admission

Applications for admission to the Faculty must be submitted on forms supplied by the Dean. No assurance can be given that applications received after August 31 (for the winter session) April 1 (for the summer session) can be processed in time to permit registration. A graduate of another university must arrange with the Registrar of that institution to forward a transcript of his academic record to the Dean prior to September 1 or March 31. The Dean may require the applicant to furnish an official description of the content of the courses listed on the transcript.

Registration

An applicant accepted by the Faculty as a candidate for a Master's degree, as a provisional candidate for the Doctor of Philosophy degree, or the Doctor of Education degree, or as a "provisional graduate student", is required:

(a) to register not later than October 1 if re proposes to work on his program during the winter session; or not later than April 29 if he proposes to work on his program in the summer session;

(b) if he registers later, to pay a late registration fee for the winter session of $3.00 and an additional $1.00 per day for each day by which the registration is postponed beyond October 1.

(c) to register for every session during which he plans to use University laboratory or library facilities;

(d) to register for the session in which he expects to complete his degree program; and

(e) to present with each registration a program of studies signed by the head of the department responsible for his graduate study program. A provisional graduate student will not be permitted to register in more than two courses in any department without approval of his program by the head of that department. Registration and program forms may be obtained from the office of the Dean.

(f) Provisional graduate students will not be accepted for extramural courses.

Academic Standards

In any course taken for credit toward an advanced degree the pass mark is 65%. No supplemental examinations are permitted. If, after consulting the department and any committee concerned, the Faculty decides that a candidate is not making satisfactory progress *in either course work or research* the candidate may be required to withdraw.

Thesis and Oral Examination

A candidate for a Master's or a Doctor's degree is required to submit a thesis and pass an oral examination. For purposes of spring graduation, a candidate is required to have the thesis approved and to pass the oral examination not later than April 14. The corresponding date for fall graduation is October 1. The thesis must be submitted to the department at least two weeks prior to the date of the oral examination. Failure to meet either of these deadlines will automatically delay the date of graduation unless special arrangements are made through the Dean.

Thesis Regulations

Number and Distribution of Copies

The student shall prepare five copies of his thesis, as follows:

1. The *original,* to be deposited in the office of the Faculty of Graduate Studies. This becomes the library copy after it has been examined by the Faculty.
2, 3. To be retained by the Department, or (if the Faculty has its own library) to become the library and the Department copy, respectively. One of these copies will be available for inter-library loan.
4. To be retained by the student.
5. To be retained by the supervisor. With the Department's permission this requirement may be waived.

Further copies may be required in special cases. For example, a student who holds a fellowship or financial assistance donated by a private individual or a company may be expected to provide a copy for the donor.

Binding

All copies should be bound in buckram (the color to be determined by the supervising Department or Division) with a short title and author's name printed in gold on the spine. Official copies (Nos. 1 - 3) *must* be so bound and lettered.

Paper

Regulation bond, 8½″ x 11″ (16 lb. weight for the initial copy). With special

permission and in special cases, 14″ paper may be used. A photographic process is acceptable for charts and diagrams.

Margins

A minimum left margin of 1½ inches is required.

Order of Items

1. Title page.
2. Approval sheet (including, if desired, an indication of the weight of the thesis in the student's total program).
3. Abstract (not more than two pages).
4. Acknowledgments, if any.
5. Table of Contents (listing chapter heads and subheads, bibliography and appendix, if any).
6. List of Tables, if any.
7. List of Figures or Illustrations, if any.
8. Body of text.
9. Bibliography.
10. Appendix, if any.

General Form and Style

This may differ somewhat from Department to Department. The main point is consistency of form, tone, and level in a given thesis. It is recommended that students consult a manual on thesis writing that has been approved by their department.

Writers may use either footnotes or keyed bibliography, or both. Footnotes may be placed either at the foot of the page, or in a group at the end of the chapter or thesis — at the option of the supervising department.

General

Specimen copies may be examined in the Reference Room of the University Library. All students are requested to look at these, and to consult their supervisor or Department Head, before commencing to prepare their theses. Samples of the title page and of the approval sheet are available in the office of the Faculty of Graduate Studies.

Time Limit

To be recommended for a degree a candidate must complete all of the requirements within six years of the time he is first accepted for graduate study.

SPECIAL REGULATIONS

THE MASTER'S DEGREE

1. Full-time attendance for a minimum period of one academic year at the University is normally required of a candidate for a Master's degree. An alternative method of meeting the residence requirement may be considered on recommendation to the Faculty of Graduate Studies by the department or division concerned. Full-time attendance means attendance at classes or continuation of research or both at the University on a substantially full-time basis while registered as a graduate student.

2. The time necessary to complete the Master's degree depends on the candidate's preparation and progress. Normally at least two academic years are required, but exceptions may be made in the case of a graduate of a four-year specialized course. Further information is given under Programs of Study (starting p. 33).

3. A candidate entering the Faculty from a general undergraduate program is required to complete work equivalent to eight courses. The division of time between courses and research is to be determined by the department in which the candidate is studying. The research requirement may vary between one-quarter and one-half of the total program.

4. A candidate entering the Faculty from a four-year specialized undergraduate program, who is continuing work in the same field, is required to complete work equivalent to six courses. The division of time between courses and research is to be determined by the department in which the candidate is studying. The research requirements may vary between one-third and five-sixths of the total program.

5. The University offers courses in the summer session, extramurally, and in evening classes. Certain of these may be accepted in a Master's degree program, but no more than three may be taken in any twelve-month period without approval of the Dean. A maximum of two of the courses required in a Master's degree program may be taken extramurally, but only if the departments concerned approve.

6. The investigation must be conducted on a subject approved by the department and the Faculty, and for which library, laboratory and other facilities are available. The work is to be done under the supervision of a specified member of a department.

7. An examining committee for each candidate is approved by the Faculty. This committee consists of at least three faculty members, one of whom is from a department other than that sponsoring the investigation. The committee reviews the thesis for approval and conducts a public oral examination. The oral examination is designed to test the candidate's knowledge not only of the subject matter of the investigation, but in subjects relevant to his field of study.

THE DEGREE OF DOCTOR OF PHILOSOPHY

1. A student may be admitted as a provisional candidate for the degree of Doctor of Philosophy if he holds a bachelor's or a master's degree, or their equivalent, from an approved university other than the University of Alberta. Applications from University of Alberta graduates who have not obtained a degree from an-

other university may be considered only on special recommendation to the Faculty of Graduate Studies by the department or division concerned. Admission is contingent upon recommendation by a department and upon the availability of suitable courses of study, library, laboratory and other facilities. Ph.D. applicants will be admitted as provisional candidates for at least one year and admission to candidacy will be approved only after the student has demonstrated competence.

2. The essential factor in the requirements for the doctorate is the demonstration on the part of the candidate of ability to carry out research of a high calibre leading to an advance in knowledge in the candidate's major field of study.

3. The time necessary to complete the requirements for the doctorate depends upon the progress of the candidate. For a candidate having a bachelor's degree a minimum of three academic years of study and research is required, of which two academic years must be in residence at the University of Alberta. For a candidate having a master's degree the normal requirement is two academic years of study and research in residence at the University of Alberta. An alternative method of meeting the residence requirement may be considered on recommendation to the Faculty of Graduate Studies by the department or division concerned.

4. The program of a candidate shall be under the direction of a committee of not fewer than three members appointed by the Faculty of Graduate Studies. The chairman of the committee shall be the faculty member under whose direction the candidate is carrying out his major research. At least one member of the committee shall be chosen from a department other than that in which the major research is being carried out. The committee shall recommend to the Faculty of Graduate Studies a program of course work and the detailed requirements of the program of research. The same committee shall arrange for the necessary examinations and for adjudication of the thesis.

5. At least one year before he presents himself for the degree, a candidate shall pass a preliminary oral examination in subjects relevant to the general field of his research. The examination shall be conducted by the supervising committee, with at least two other members of the teaching staff added to their number.

6. Before the candidate takes his preliminary examination he shall satisfy his committee that he possesses a knowledge of one of French, German and Russian sufficient for the reading of publications in this language. Departments may demand proficiency in such additional languages as are necessory. Students should check departmental requirements.

7. The results of the candidate's research shall be presented in a thesis satisfying the general requirements of the Faculty of Graduate Studies. The material must be of sufficient merit to be acceptable for publication in a reputable scientific or other scholarly journal. The thesis shall be approved by an examining committee, which shall consist of the supervisory committee and at least two other examiners, one of whom shall be an external examiner who is a recognized authority in the special field of research.

8. After the thesis has been approved, the examining committee shall conduct a public oral examination of the candidate, based largely upon the thesis.

THE DEGREE OF DOCTOR OF EDUCATION

The degree of Doctor of Education attests proficiency in a program of graduate study in which the emphasis is upon preparation for competent professional performance. The general regulations with respect to admission, residence requirements, preliminary examinations and final examinations for the Ed.D. degree are the same as those listed for the Ph.D. degree with the following exceptions:

(1) Several years of successful teaching and an M.Ed. degree or its equivalent are prerequisites for admission.

(2) A reading knowledge of French is required. Under special circumstances another language may be substituted.

(3) The program emphasizes breadth in educational theory, practice and research rather than intensive specialization in a particular area.

(4) The student's program may make provision for supervised field experiences.

THE DEGREES OF DOCTOR OF SCIENCE AND DOCTOR OF LETTERS

The degree of Doctor of Science (D.Sc.) or of Doctor of Letters (D.Litt.) may be conferred on persons considered by the General Faculty Council to have distinguished themselves by special research or learning in the respective domains of science and of the humanities or social sciences, subject to the following regulations:

1. The degrees of Doctor of Science and of Doctor of Letters are awarded exclusively on the basis of original work of merit carried out by the candidate, either individually or in cooperation with others. In the case of an application based upon cooperative work, the candidate shall submit a written statement indicating the share he personally has taken in the work. A reasonable proportion of the work must have been carried out at the University of Alberta.

2. Application must be made in writing to the Dean of the Faculty of Graduate Studies and should be accompanied by four reprints of all papers and by at least one copy of each book submitted by the candidate. The application, accompanied by the proper fee, must be submitted before the first day of November of the academic year in which it is proposed to take the degree.

PROGRAMS OF STUDY

This section contains alphabetically, according to departments, brief descriptive paragraphs which outline the departmental facilities, the fields of research and special interests, and special departmental regulations together with titles of graduate courses offered by the departments. Further information on courses, both graduate and undergraduate, will be found in the calendar of the appropriate Faculty or School.

NOTE: In the case of courses in which the weekly hours of instruction are fixed, these are set out for both terms of the winter session. The letter "s" attached to a figure signifies seminar-hours, the letter "a" hours allotted to assignments or discussion of assignments, and the letter "L" lecture-laboratory hours. Otherwise, the first figure in each term indicates lecture-hours and the second laboratory-hours. A new course numbering system was introduced last year. In some sections both the old and new numbers are included.

ANATOMY

Laboratory accommodation for a small number of graduate students is open to Arts and Science graduates and to medical students and graduates who wish to spend a year out of course doing advanced work in medical sciences. Application should be made as early as possible in the year preceding that in which the student plans to work.

ANIMAL SCIENCE

1. Graduate study may be undertaken in either the Animal Husbandry or Poultry Husbandry division of the Department of Animal Science. Excellent facilities are available for nutritional studies with livestock and poultry. A well-equipped chemical laboratory is maintained for research purposes.
2. The major part of the research effort of the department is in the field of nutrition and in this field a variety of programs of course work and research for advanced degrees may be arranged along fundamental or applied lines according to the qualifications and interests of individual students.
3. Opportunities are available for graduate study in animal or poultry breeding.
4. Information regarding assistantships and other forms of financial assistance currently available to students registered in programs for the M.Sc. or Ph.D. degree in the department will be supplied upon request. Students who wish to apply for assistance are advised to contact the head of the department by January 1 of the year in which they propose to register for graduate study.
5. The time required to complete a Master's program in the department varies according to the undergraduate training of the student and the nature of the research undertaken. Normally two academic years of course work and research and one summer of research or one academic year and two summers are needed to complete the requirements for the M.Sc. degree.
6. Normally students enrolled for the M.Sc. degree are required to complete two of the Animal Science graduate courses listed below plus at least two courses taken

in other departments. Courses in other departments commonly accepted in a Master's program are: Biochemistry 511, 531, 541; Biometrics 454; Chemistry 312, 370 or 372, 450; Genetics 462, 530, 612; Mathematics 304, 450; Pharmacy 501, 502; Zoology 410.

7. Courses for students enrolled for the Ph. D. degree may be arranged according to the background and interests of the candidate.

8. *Graduate Courses*

501. Research Projects in Animal Science Max. of 6 hrs. credit
STAFF

512. Advanced Nutrition (3-3; 3-0)
STAFF

600. Animal Science Seminar (1s-0; 1s-0)
STAFF

BACTERIOLOGY

1. Laboratory apparatus or bench space is available for two to three graduate students. Apparatus available is adequate for any investigational problem normally expected of Master's candidates. The facilities of the Provincial Public Health Laboratory, which carries out laboratory work for hospitals and practitioners within the northern half of the province, are also available.

2. The Department will consider investigational problems submitted by candidates in any field involving fundamental or applied bacteriology. Research grants, etc., may be available through the usual channels provided adequate time is allowed for application and approval.

3. Candidates for graduate work will be required to have a reasonable background in bacteriology or microbiology. In this University a reasonable background is indicated by a good standing in either the senior undergraduate course in Medical Bacteriology (i.e. Bacteriology 421(21)-361(61)) or the senior undergraduate course in Microbiology (Microbiology 360(60)). Students with an equivalent background from other universities will be considered by the Department for graduate work. Candidates will be expected to complete with good standing all senior undergraduate courses in medical bacteriology and microbiology which have not been completed during undergraduate years. In addition, much emphasis will be placed on the presentation of original material in seminars, on discussions concerning investigational work in progress in the Department, and on an adequate knowledge of research methods.

4. The following courses from other departments may be accepted in graduate programs: Agricultural Bacteriology, (Dairying 465(55)), Dairy Bacteriology (Dairying 466(56)), Soil Microbiology (Soil Science 430(54)), Genetics 451 (51), French 200(2), Mathematics 255(45), Biochemistry 511(101), German 200(2), and other courses as indicated in individual cases.

5. *Graduate Courses*

501. (101.) Microbiology
MEMBERS OF THE DEPARTMENT

BIOCHEMISTRY

1. The Department offers a program of course work and research leading to the degree of M.Sc or Ph.D. Prospective candidates should consult the head of the Department regarding research facilities and course requirements. Teaching assistantships and demonstratorships are often available, as well as financial assistance from research grants to faculty members. Application for financial assistance should be made, if possible, by December of the year previous to that in which the student wishes to begin graduate work. Availability of funds is usually made known by April.
2. The research work in the Department is at present in the following fields: chemistry of red blood cells; enzymes concerned with gasotrointestinal digestion and absorption; oxidative enzymes in tumor tissue; plant metabolism; chemistry and physical chemistry of proteins, lipid metabolism; clinical chemistry.
3. The following courses from other departments may be accepted on Master's programs: Bacteriology 360, Chemistry 450, 372, 312, Mathematics 304, Physiology 361.
4. *Graduate Courses*

501. Advanced Laboratory (0-3; 0-3)
STAFF

511. (101.) Enzymology (3-3;0-0)
J. TUBA

531. (103.) Chemistry of Proteins (3-0; 0-0)or(0-0; 3-0)
L. B. SMILLIE AND C. M. KAY

541. Biochemistry of Lipids (3-0; 0-0) or (0-0; 3-0)
E. T. PRITCHARD

551. (105.) Advanced Plant Biochemistry (3-0; 0-0)or(0-0; 3-0)
MARY S. SPENCER

561. (106.) Chemistry of the Erythrocyte (3-0; 0-0)or(0-0; 3-0)
H. B. COLLIER

571. (104.) Recent Advances (3-0; 0-0)or(0-0; 3-0)
STAFF

N.B.— Not all graduate courses are offered every year. The head of the Department should be consulted regarding the availability of graduate courses in any academic session.

BOTANY

1. Laboratory accommodation for graduate students is available, with facilities for research in plant anatomy, cytology, morphology, ecology, taxonomy, physiology, and mycology.

   Undergraduate students interested in graduate work in botany are invited to apply for assistantships tenable during the summer months to enable them to take part in research work.
2. A number of students are appointed as demonstrators in junior courses each year.
3. The following courses in other departments are commonly accepted as part of the M.Sc. program in Botany: Bacteriology 360(60), Biochemistry 300(50),

350(71), Chemistry 350(42), 372(54), 312(58), Entomology 301(41), Geology 353(53), Mathematics 255(45), Physics 341(41), Genetics 451(51), Plant Science 453(53), 481(81), 482(82), Soil Science 420(56).

4. *Graduate Courses* (6L; 6L)

503. Plant Geography and Ecology

504. Advanced Mycology

505. Advanced Plant Physiology

506. Advanced Taxonomy

507. Advanced Plant Anatomy and Histology

CHEMICAL AND PETROLEUM ENGINEERING

1. The Department of Chemical and Petroleum Engineering offers facilities for advanced training and research leading to the Ph.D. degree in Chemical Engineering and to the Master of Science degrees in both Chemical and Petroleum Engineering.

   For the Ph.D. program, all the requirements of the Faculty of Graduate Studies must be met. In addition, the Department requires that the candidate shall have satisfactorily completed approved courses in the major field and in at least one minor. Minimum requirements in the major field are courses equivalent to 24 term hours, 6 of which may be selected from the Department of Chemistry. Minimum requirements for the minor are 12 term hours in one field or 14 term hours in two fields. As part of the requirement for demonstrating competence for admission to candidacy for the Ph.D., a student must pass the comprehensive examinations set by the Department. These consist of three written examinations embracing the major fields of Chemical Engineering. A passing grade shall be 65% and not more than two may be repeated. The examinations are offered annually in September and may be written after the completion of one year of graduate studies by the candidate and after satisfying one of the foreign language requirements. Research may be started by the candidate at the discretion of the Department but normally would not be commenced until after he had passed the comprehensive examinations.

   For the Master of Science degree, graduate work comprising both course and research work equivalent to a minimum of 12 months of full-time study is required. For the M.Sc. degree in Chemical Engineering, the minimum course requirements are Ch.E. 561, Ch.E. 567, Ch.E. 572, two other department graduate courses, and one further course, preferably outside the specialty. For the M.Sc. degree in Petroleum Engineering, the minimum course requirements are Pet.E. 582, Pet.E. 583, Pet.E. 592, either Pet.E. 585 or Pet.E. 584, either Ch.E. 577 or Pet.E. 580, and one other course, preferably outside the specialty.

   The Master programs are designed so that about 50% weight is given to course work and 50% weight to research and thesis. Details of all programs must be worked out in consultation with the Department.

2. In chemical engineering, active research programs are being carried out in the following fields—flow of non-Newtonian fluids, two-phase vertical flow, hydrocarbon P-V-T and gas hydrate studies, pilot plant work in hydrocarbon pyrolysis processes, fluidization, reaction kinetics and catalysis, fluid dynamics of gas-solid systems.

In petroleum engineering, facilities are available for research in fluid flow through porous media, drilling fluids, electrical and physical characteristics of reservoir rocks, crude oil rheology and pipeline flow, miscible fluid displacement phenomena, flow phenomena in heterogeneous rock systems.

3. Up to the limit of its facilities, the Department is prepared to accept for graduate study in the appropriate field graduates from any university having a recognized curriculum in either Chemical or Petroleum Engineering. Graduates in other fields of engineering may be admitted under special arrangements involving the completion of undergraduate requirements.

4. Teaching assistantships are available for qualified students on a one-quarter, one-half or full time basis with remuneration according to the students' background and the hours of service. Scholarships and fellowships are available for research in both the fields of Chemical and Petroleum Engineering. Summer assistance can usually be arranged for students continuing their research through the summer months without scholarship support.

5. *Graduate Courses*

Chemical Engineering

561.	**Physical Rate Processes**	(3-0; 0-0)
562.	**Selected Topics in Unit Operations**	(0-0; 3-0)
565.	**High Pressure Technology**	(3-0; 0-0)
566.	**Process Control**	(0-0; 1-3)
567.	**Advanced Thermodynamics**	(0-0; 3-0)
572.	**Graduate Seminar**	(1-0; 1-0)
577.	**Advanced Mathematical Applications in Chemical and Petroleum Engineering**	(3-0; 0-0)

Petroleum Engineering

580.	**Advanced Physical Properties and Behaviour of Petroleum Fluids**	(3-1; 0-0)
582.	**Advanced Reservoir Engineering**	(3-0; 0-0)
583.	**Advanced Topics in Petroleum Production Mechanisms**	(0-0; 3-0)
584.	**Secondary Recovery**	(0-0; 2-3/2)
585.	**Advanced Natural Gas Engineering**	(0-0; 2-0)
592.	**Graduate Seminar**	(1-0; 1-0)

CHEMISTRY

1. The Department of Chemistry has research laboratories and instructional facilities for at least one hundred and twenty graduate students proceeding to the M.Sc. and Ph.D. degrees in Chemistry.

2. The active research interests of the staff include:
Amperometric titrations and polarography. Mechanism of sustitution reactions, optical activity, structure and thermodynamic stability of condensation compounds. Optical studies of solutions around working electrodes. Free radical reactions by mass spectrometry, deuterium exchange studies, isotope effects in acid-base catalysis and reactions of active nitrogen.

Mechanisms and stereochemistry of solvolytic reactions, mechanisms of homogeneous reductions and oxidations. Structures of monosaccharide derivatives and lycopodium alkaloids. Syntheses of carcinogens and anticarcinogens; condensation reactions of substituted toluenes, indoles, monosaccharide derivatives, sesqui- and diterpenes; reactivity of cellulose.

Photochemistry applied to boron hydrides, kinetics and free radical reactions, reactions at solid surfaces separation of isotopes. Physical chemistry of polymer and polyelectrolyte solutions (viscosity, light scattering, etc.). Radiation induced free radical chain reactions in the gas phase and in the liquid phase at low temperature, and the general radiation chemistry of organic compounds. Electron spin resonance studies of free radical reactions, active nitrogen flame reactions, relation of infrared band parameters to molecular structure. Molecular orbital methods.

3. Candidates for the M.Sc. and Ph.D. degrees in Chemistry should be graduates in Chemistry or Chemical Engineering from approved Universities, who meet the entrance requirements of the Faculty of Graduate Studies. All arrangements must be made through consultation with Professor H. E. Gunning, Head of the Department.

4. *Graduate Courses*

511. (105.) Instrumental Methods of Analysis (0-0; 2-6)
W. E. Harris

531. (106.) Advanced Inorganic Chemistry (3-3; 0-0)
W. J. Wallace

550. (102.) Organic Chemistry (3-6; 3-6)
R. B. Sandin

551. (109.) Qualitative Organic Analysis (2-6; 0-0)
R. J. Crawford

553. (112.) Chemistry of Carbohydrates (0-0; 3-3)
R. K. Brown

555. (114.) Theoretical Organic Chemistry (0-0; 3-0)
R. J. Crawford

557. (119.) Physical Organic Chemistry (0-0; 3-0)
D. Darwish

559. (120.) Natural Products (3-0) (0-0)
W. A. Ayer

571. (107.) Colloid Chemistry and Surface Chemistry (3-3; 0-0)

573. (108.) Electrochemistry (0-0; 2-6)

575. (111.) Gas Kinetics (3-3; 0-0)
G. R. Freeman

577. (113.) The Phase Rule and Heterogeneous Equilibria (3-0; 0-0) or (0-0; 3-0)

579. (115.) Chemical Thermodynamics (3-0; 0-0)
H. B. Dunford

581. (116.) High Vacuum Techniques (3-3; 3-3)
P. Kebarle

583. (117.) Quantum and Statistical Mechanics (0-0; 3-0)
R. N. O'Brien

585. (118.) Solution Kinetics (0-0; 3-0)
H. B. Dunford

602. (151.) Departmental Research Seminar (2S-0; 2S-0)
H. E. Gunning

587. Spectroscopy and Molecular Structure (0-0; 3-0)
P. Krueger

604. (152) Advanced Research Seminar (2S-0; 2S-0)
Chemistry Staff

611. Analytical Chemistry (0-0; 3-0)
W. E. Harris

631. Inorganic Chemistry (3-0; 0-0)
W. J. Wallace

651. Organic Chemistry (3-0; 0-0)
R. B. Sandin

653. Organic Chemistry (0-0; 3-0)
R. B. Sandin

670. (104) Advanced Physical Chemistry (3-0; 3-0)
H. E. Gunning

671. Physical Chemistry (4-0; 0-0)
H. B. Dunford

673. Physical Chemistry (0-0; 0-4)
H. B. Dunford

CIVIL ENGINEERING

1. Graduate work in the Department of Civil Engineering is carried out in the following fields:

   (a) *Soil Mechanics*
   Theoretical, experimental and problem courses related to the design of foundations, retaining walls, earth dams and slides.

   (b) *Highway Engineering*
   Theoretical, experimental and problem courses related to transportation engineering including planning, traffic and safety; the design and control of asphalt and concrete pavements and construction practice.

   (c) *Structures and Strength of Materials*
   Theoretical and experimental courses relating to the behavior of structures and structural elements, together with a thorough treatment of the analysis and design specifications of steel and reinforced concrete.

   (d) *Concrete*
   Experimental work related to durability, effects of admixtures, and properties of lightweight aggregate.

(e) *Hydraulics and irrigation*
Theoretical and experimental courses relating to the sedimentation and the design and control of river channels and canals.

The Department has well-equipped laboratories, particularly in the fields of soil mechanics, strength of materials, concrete, and hydraulics.

2. A student may be admitted as a candidate for the degree of Master of Science in Civil Engineering who holds a Bachelor's degree in Civil Engineering from the University of Alberta or from another recognized university and who has an average of at least 65% in his two senior years. Competent students from other departments will also be considered but may be required to take additional undergraduate courses as provisional graduate students before being admitted as candidates for a Master's degree in Civil Engineering. Normal requirements for a Master's degree are credit in four courses, two of which must be in the candidate's major field of interest, plus a thesis. In exceptional cases the course requirements may be reduced and additional work required on the thesis.
A candidate may complete his Master's program in twelve months. However, students are advised if possible to spend two years, during which time they may be able to devote more time to their thesis topic and do guided reading in their special field. Financial assistance is available in the form of teaching assistantships or special research scholarships.
3. Any undergraduate course in the University that the Department deems necessary for acquiring a thorough background in the candidate's special field may be included in a graduate program.
4. A student may be admitted as a candidate for the degree of Doctor of Philosophy only in the fields of Soil Mechanics and Foundations, or Hydraulics and Hydrology.
5. *Graduate Courses*

C.E. 510. Pavement Design (2-2; 2-2)
K. O. Anderson

C.E. 512. Transportation Engineering and Geometric Highway Design (3-0; 3-0)
J. J. Bakker

C.E. 530. Advanced Fluid Mechanics (3-0; 3-0)
T. Blench

C.E. 532. Advanced Hydrology (3-0; 3-0)
T. Blench

C.E. 533. River Engineering (3-0; 3-0)
T. Blench

C.E. 535. Open Channel Flow (3-0; 3-0)
J. P. Verschuren

C.E. 540. Theoretical Soil Mechanics (3-0; 3-0)
S. R. Sinclair

C.E. 541. Advanced Soil Mechanics Laboratory (0-6; 0-6)
S. R. Sinclair

C.E. 542. Advanced Soil Mechanics Problems (3-0; 3-0)
R. M. Hardy

C.E. 560. Advanced Structural Analysis (3-0; 3-0)
J. S. KENNEDY

C.E. 561. Plastic Analysis and Design of Structures (0-0; 3-0)
J. LONGWORTH

C.E. 562. Advanced Design in Structural Steel (3-0; 3-0)
J. LONGWORTH

C.E. 563. Advanced Design in Reinforced Concrete (3-0; 3-0)
R. N. MCMANUS

CLASSICS

1. Certain special facilities available in this Department include: Coins—fairly complete examples of Roman coins of Empire Period (100 in all), and electrotypes of Greek and Roman coins; Glass—a collection of Roman glass (from Norton collections); Antiquities—on permanent loan from the Royal Ontario College of Archaeology, a number of objects useful for the study of Egyptian and Roman History; Vases—five original Greek vases; Slides—a fairly extensive collection of slides on subjects such as the Minoan-Mycenean civilization, Greek sculpture, Greek vase painting, etc.
2. In addition to the regular courses in Linguistics and History the Department can offer introductory courses in Numismatics (see above), Palaeography, Epigraphy, Sanskrit, and General Archaeology. There are *no* provisions for assistantships or fellowships.
3. Graduates from the general course may find it difficult to take an M.A. in Classics since the primary requisite is a knowledge of Greek and Latin. An M.A. in Latin or in Latin and French can be arranged in consultation with the Department.
4. French or German junior or senior courses and courses in the History of Philosophy may on occasion appear in M.A. programs.
5. *Graduate Courses* (3-0; 3-0)

Greek 501. (101.) Plato and Aristotle
To be selected

Greek 502. (102.) Homer, Iliad
W. G. HARDY

Greek 503. (103.) Pindar, Odes
W. G. HARDY

Greek 511. (111.) Advanced Greek Prose Composition

Greek 515. (115.) Greek and Latin Epigraphy and Palaeography
W. G. HARDY

Latin 501. (101.) Cicero, Rhetorical Writings
To be selected

Latin 502. (102.) Roman Comedy
W. G. HARDY

Latin 503. (103.) Lucretius, De Rerum Natura
A. D. WINSPEAR

Latin 504. (104.) Greek and Italic Dialects
To be selected

Latin 505. (105.) Vergil, Complete Works
W. G. HARDY

Latin 506. (106.) Sanskrit
W. G. HARDY

Latin 507. (107.) Petronius, Apuleius
W. G. HARDY

Latin 508. (108.) Tacitus
W. G. HARDY

Latin 509. (109.) Tibullus, Propertius, Ovid, Amores

Latin 511. (111.) Advanced Latin Prose Composition

Latin 514. (114.) Comparative Philology and Comparative Syntax
To be selected

DAIRY SCIENCE

1. The laboratories of the Department of Dairy Science are well equipped for research in dairy and food chemistry, dairy and food bacteriology, dairy and food technology and agricultural bacteriology. Research programs in these specialties are active in the Department.

2. The research of this Department receives financial support from such bodies as The Department of Agriculture, Ottawa; The National Research Council of Canada; and the National Defence Research Board. Such grants-in-aid provide for a limited number of assistantships. The assistants, if eligible, are permitted to register in the Faculty of Graduate Studies and their research findings may be presented to the University as M.Sc. or Ph.D. theses. Various Graduate Fellowships and Scholarships, such as those offered by the above-mentioned organizations are tenable in the Department.

3. Ordinarily Biochemistry 300 or 350, Chemistry 372, Mathematics 200 or 201, Dairy and Food Technology 350, Dairy and Food Bacteriology 466, Dairy and Food Chemistry 470 and Dairy Science 490 or their equivalents are admission requirements.

   A reading knowledge of French or German within the field of interest is required for candidacy for the M.Sc. or Ph.D. degree, but a University course in either language is an acceptable substitute.

   Graduates planning candidacy for a post graduate degree should consult with a member of the Department.

4. Extra-departmental undergraduate courses for which graduate credit may be given are: Animal Husbandry 468, 469; Microbiology 360, 361; Biochemistry 300 or 350; Botany 310, 320; Soil Science 430.

   In special circumstances graduate credit may be given for Chemistry 372, Mathematics 200 or 201.

5. *Graduate Courses*

Dairy Science 500. Seminar **(1-0; 1-0)**
L. F. L. CLEGG, F. W. WOOD AND J. M. DE MAN

Advanced Dairy and Food Hygiene 471. Max. yearly credit one half course
L. F. L. CLEGG

Advanced Food Chemistry 571. Max. yearly credit one half course
J. M. DE MAN

Advanced Dairy and Food Technology 600.
Max. yearly credit one full course
F. W. WOOD AND L. F. L. CLEGG

Advanced Applied Bacteriology 601. Max. yearly credit one full course
L. F. L. CLEGG

Advanced Dairy and Food Chemistry 602.
Max. yearly credit one full course
J. M. DE MAN AND L. F. L. CLEGG

EDUCATIONAL ADMINISTRATION

1. Students who satisfy the admission requirements of the Faculty of Graduate Studies and who have the approval of the Division of Educational Administration may pursue programs of study and research leading to the degrees of M.Ed., Ed.D., and Ph.D. in Education.
2. Prospective students should first consult the Chairman of the Division for further information on programs of advanced study.
3. The work of this Division is closely co-ordinated with that of other divisions in the Faculty of Education. Furthermore, approved courses complementing or supplementing a candidate's program in education may be taken from departments in the university outside the Faculty of Education.
4. The Division makes special arrangements with public school systems and provincial departments of education so that facilities are available for student observation, research and participation in field projects.
5. A grant from the W. K. Kellogg Foundation of Battle Creek provides a number of fellowships for graduate students in educational administration. Several teaching fellowships in the Faculty of Education are also provided. The facilities of the Alberta Journal of Educational Research, published under the supervision of the Faculty and sponsored by the Alberta Advisory Committee on Educational Research, are available to graduate students in this Division.
6. *Graduate Courses*

Education

500. Education Seminar
STAFF

525. Education Supervision (0-0; 3-0)
J. H. M. ANDREWS

559. Administration of Public Education in Canada (3-0; 0-0)
H. T. SPARBY

561. Principles of Educational Administration (3-0; 0-0)
A. W. REEVES

563. Administrative Role of Principals and Superintendents (0-0; 3-0)
TO BE ANNOUNCED

NOTE: Full-year courses corresponding to the four half-year courses listed above are also available. They contain the topics covered in Education 525, 559, 561, and 563, plus additional related topics, and are designated Education 526, 560, 562, and 564 respectively.

566. Educational Finance (3-0; 3-0)

G. L. MOWAT

568. School Buildings and Pupil Transportation (3-0; 3-0)

G. L. MOWAT

NOTE: Courses numbered in the 600's are conference courses in which credit is given according to work done, to a maximum of six hours.

626. Educational Supervision

J. H. M. ANDREWS

660. Conference Course in Organization and Government of Public Education

H. T. SPARBY

662. Conference Course in Problems of Administration and Supervision

A. W. REEVES

664. Conference Course in Administrative Role of Principals and Superintendents

TO BE ANNOUNCED

666. Conference Course in Educational Finance

G. L. MOWAT

EDUCATIONAL PSYCHOLOGY

1. The Division of Educational Psychology has available for graduate students a psychometric laboratory, equipment for testing of vision and hearing, and special equipment for the diagnosis of reading difficulties. It operates an education clinic providing testing, diagnosis of special difficulties, and guidance for pupils referred to it from elementary and secondary schools. Staff members and graduate students have access to a modest IBM installation housed in the Education Building and used for the analysis of research data. Large sample research in intelligence, aptitude, interests, subject attainment and other areas of psychological importance may be arranged through the co-operation of the various school systems.

2. The Division provides graduate instruction in the areas of: (a) Educational Psychology; (b) Child Psychology; (c) Adolescent Psychology; (d) Mental Hygiene; (e) Guidance; (f) Clinical Psychology; (g) Testing and Measurement.

   One assistantship is usually available in Clinical Psychology in winter sessions and in the summer session when the Education Clinic is in operation. One research assistantship is normally available during winter sessions.

3. Before a graduate student is admitted as a candidate for the M.Ed. degree his record must be acceptable to the Faculty of Graduate Studies and to the Division of Educational Psychology. The student will first consult with the Chairman of the Division, who, together with the members of the divisional staff, will plan an appropriate program. When the program has been recorded on the form provided by the Faculty of Graduate Studies and approved by the Chairman of the Division, it will be forwarded to the Dean of the Faculty of Graduate Studies for final ratification.

4. Approved senior courses in the Faculty of Arts and Science which strengthen or complement the candidate's graduate program in education are accepted on Master's programs.
5. The Division also provides instruction and guidance for suitable candidates entering upon the Ph.D. and Ed.D. programs.
6. The Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, maintains its headquarters in this Division. A grant from the Carnegie Corporation of New York provides a limited number of research fellowships for graduate students as well as funds for the extension of the research program. The *Alberta Journal of Educational Research* published under the supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
7. *Graduate Courses*

Education 500. Education Seminar
STAFF

502. Introduction to Educational Research
D. B. BLACK

508. Organization and Administration of the Guidance Program (3-0; 3-0)
C. M. CHRISTENSEN

510. Counselling in Education (3-3; 3-3)
C. M. CHRISTENSEN

570. Child Psychology (3-0; 3-0)
C. C. ANDERSON

572. Psychology of Adolescence (3-0; 3-0)
G. M. DUNLOP

574. Education Clinic (3-0; 3-0)
W. B. DOCKRELL

576. Methods of Educational Research (3-3; 3-3)
J. MACDONALD AND J. D. AYERS

578. Advanced Testing and Measurement (3-0; 3-0)
R. S. MACARTHUR

670. Conference Course in Developmental Psychology Max. of 6 hrs. credit
J. MACDONALD

674. Conference Course in Problems of Adjustment of School Children Max. of 6 hrs. credit
C. C. ANDERSON

676. Conference Course in the Psychology of Learning Max. of 6 hrs. credit
G. M. DUNLOP

678. Conference Course in Education Measurement and Experimental Research Max. of 6 hrs. credit
R. S. MacArthur

Other suitable graduate courses are listed under Secondary Education, Elementary Education, and Administration and Supervision.

ELECTRICAL ENGINEERING

1. Graduate work is offered by the Department of Electrical Engineering for electrical engineering graduates only, as our Mechanical Engineering Department is not equipped for advanced work of any kind.
2. The Department has facilities for research work in communication and UHF fields, and possesses modern research equipment including pulse type oscillograph. It also embodies a high voltage laboratory, equipped for investigation up to 100 kV 60 cycle and up to 400 kV impulse. Investigation can be undertaken in the field of insulation, power transmission, radio and telephone interference problems.
3. Part-time instructorships are available for graduate students who normally carry auxiliary courses in mathematics and physics. While these are usually in the graduate pattern, certain undergraduate courses are accepted if they are appropriate to the graduate program.
4. Graduate courses normally offered are:

521. (102.) Electric Circuits, Modern Power Transmission Problems (2-6; 2-6)
J. A. Harle

561. (103.) Principles of Servomechanisms (2-6; 2-6)
J. W. Porteous

571. (101.) Advanced Radio (2-6; 2-6)
J. W. Porteous

ELEMENTARY EDUCATION

1. Associated with the Division of Elementary Education are demonstration schools —city, town and rural. To a limited degree the facilities of these schools may be made available as centres for special studies by graduate students. The facilities of the Department of Education may, by special arrangement, be made available to students doing graduate work.
2. The Division provides graduate instruction for three categories of students: (a) those interested in perfecting their instructional techniques for the primary and intermediate grades of the elementary school; (b) those interested in improving their qualifications to teach in a specialized subject matter area in the junior high school; (c) those interested in improving their instructional techniques in the elementary and junior high school subjects in order to become qualified for supervisory or administrative positions.

   At present there is no provision for assistantships or fellowships in this Division.
3. Before a graduate student is admitted as a candidate for the M.Ed. degree his record must be acceptable to the Faculty of Graduate Studies and to the Division of Elementary Education. The student will first consult with the Chairman of

the Division, who, together with the student and members of the divisional staff will plan a master's program.

4. Approved senior courses in the Faculty of Arts and Science and in the Faculty of Education which strengthen or complement the candidate's program in Education may be assigned.
5. The research facilities provided through the Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, are available to graduate students in this Division. The *Alberta Journal of Educational Research* published under the supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
6. *Graduate Courses*

Education 500. Education Seminar
STAFF

518. Problems in Remedial Reading **(3-0; 3-0)**
MARION JENKINSON

520. Clinical Study of Remedial Reading **(3-3; 3-3)**
STAFF

522. Psychology and Supervision of Reading **(3-0; 3-0)**
STAFF

528. The Learning and Teaching of Mathematics in the Elementary and Junior High School **(3-0; 3-0)**
STAFF

682. Conference Course in Elementary Education **Max. of 6 hrs. credit**

Other suitable graduate courses are listed under Educational Psychology, Secondary Education, and Administration and Supervision.

ENGLISH

1. The English collection in the University Library permits work at the Master of Arts level in most fields of English Language and Literature. The Woods Collection on American-Canadian Relations makes possible advanced study of American Literature. An historical collection of children's books is also available.
2. The Department of English has regular provision for teaching assistantships. Application should be made, if possible, by April 30. Certain of the scholarships mentioned on pages 544-550 are also available for research in English.
3. Candidates for the Master's degree in English must satisfy the general regulations laid down above on pages 449-451. For candidates with an Honors B.A. in English, the standard prescription is four courses and a thesis. Candidates from the general undergraduate program are required to take six courses (plus the thesis). When the thesis undertaken is a major piece of work, the number of courses may be reduced.
4. Senior courses from other departments (such as History, Philosophy, Classics, Modern Languages, Fine Arts) may, with the approval of the Department, be chosen as minor subjects in English programs.

5. Courses of study will be prescribed from the published list of Senior Undergraduate courses, properly weighted for graduate work, and from the following graduate courses. Certain of these will be open to graduate students in other departments.

552.	**(140.) Conference Course**	**(3-0; 3-0)**
560.	**(141.) Bibliography and Methods of Research**	**(1-0; 1-0)**
568.	**(142.) Literary Criticism (Principles and History)**	**(3-0; 3-0)**
576.	**(143.) Study of Language**	**(2-0; 2-0)**
584.	**(144.) Advanced Course in Writing**	**(3-0; 3-0)**
588.	**Studies in American Literature**	**(3-0; 3-0)**
592.	**(150.) Old Norse and Germanic Philology**	**(3-0; 3-0)**
610.	**(151.) Old English**	**(3-0; 3-0)**
616.	**(152.) Chaucer and his Contemporaries**	**(3-0; 3-0)**
622.	**(153.) The Scottish Chaucerians and English Literature of the Fifteenth Century**	**(3-0; 3-0)**
628.	**(154.) Mediaeval Drama**	**(3-0; 3-0)**
634.	**(160.) Spenser and Donne**	**(3-0; 3-0)**
640.	**(161.) Shakespeare and his Contemporaries**	**(3-0; 3-0)**
646.	**(162.) Early Seventeenth Century Poetry and Prose**	**(3-0; 3-0)**
652.	**(163.) Milton**	**(3-0; 3-0)**
658.	**(171.) Eighteenth Century Prose**	**(3-0; 3-0)**
664.	**(180.) Wordsworth and Coleridge**	**(3-0; 3-0)**
670.	**(181.) Nineteenth Century Thought**	**(3-0; 3-0)**
676.	**(190.) Studies in the Modern Novel**	**(3-0; 3-0)**
682.	**(192.) Poetry in English since 1939**	**(3-0; 3-0)**

NOTE: The following courses will be offered in the 1960-61 session: English 560 (J. W. Bilsland), English 628 (F. M. Salter), and English 670 (E. W. Mandel and R. D. McMaster).

ENTOMOLOGY

1. Laboratory space is available for eight to ten graduate students. For research in taxonomy an extensive collection and reprint library exists. There is basic equipment for study and experiment in morphology, physiology, and applied entomology. Funds for special projects can usually be made available.
2. Candidates may register for the M.Sc. or Ph.D. degree.
3. Programs may include Entomology 301(41), 422(62), 523(63), 414(64), 475 (65), 456(66), and courses from other departments appropriate to the student's needs and interests, such as the following: Bacteriology 400(60); Biochemistry 350(71), Botany 310(51), 320(52), 504(104), 505(105), Chemistry 372(54), 312(58) Geology 353(53), German 310(40b), Genetics 462(62), Philosophy 360 (61), Physics 341(41), Physiology 361(61), 462,(62), 505(105), 506(106), Plant Pathology 481(81), 482(82), Biometrics 454(53), 603(103), Mathematics 255(45), 450(62), Soil Science 430(54), Zoology 300(51), 350(52), 460(54), 580(105), 521(110).

4. *Graduate Courses*

Entomology 512. (102.) Advanced Morphology, Physiology, and Histology (0-6; 0-6)
B. HOCKING

Entomology 521. (101.) Taxonomy for Graduate Students (0-6; 0-6)
G. E. BALL

GEOGRAPHY

1. The Department of Geography offers the M.A. and the M.Sc. in Geography.
2. Canadidates' programs will be prepared under the regulations for "The Master's Degree" (see p. 452), with the further requirement of a reading knowledge of a modern foreign language other than English (ordinarily French or German).
3. A number of teaching assistantships are available for qualified students.
4. Courses in other departments may be chosen as subjects of minor interest with the approval of the Department.
5. Courses of study will be prescribed from the published list of senior undergraduate courses and from the following graduate courses:

Geography 501. Air Photo Interpretation (6L; 6L)
A. H. LAYCOCK

Geography 502. Reading and Seminar Course
STAFF

Geography 504. Mediterranean Lands (3L-1s; 3L-1s)
R. COMMON

Geography 506. Scandinavia (3-1s; 3-1s)
W .C. WONDERS

Geography 550. Research in Regional Geography
STAFF

Geography 551. Research in Physical Geography
STAFF

GEOLOGY

1. The Department of Geology offers graduate work to the level of the Doctor's degree. The M.Sc. or Ph.D. degree may be obtained by passing satisfactorily a suitable course of studies in addition to the presentation of a thesis.
2. The fields of study open for research in the Department are: mineralogy, petrology, geochemistry, paleontology, stratigraphy, sedimentation, economic geology, geomorphology, glacial geology and structural geology. Teaching assistantships are available for qualified students.
3. *Graduate Courses*

Geology 501. (101.) Advanced Structural Geology (0-0; 3-0)
H. A. K. CHARLESWORTH

Geology 502. (102.) Sedimentary Petrology and Sedimentation (2-0; 0-4)
J. LERBEKMO

Geology 503. (103.) Advanced Stratigraphy (3-3; 3-3)
P. S. WARREN

Geology 505. (105.) Micropaleontology (2-4; 2-4)
C. R. STELCK

Geology 506. (106.) Geochemistry (3-3; 3-3)
H. Baadsgaard

Geology 507. (107.) Igneous and Metamorphic Petrology (0-0; 3-3)
R. A. Burwash

Geology 508. Precambrian Geology (3-3; 0-0)
R. A. Burwash

Geology 510. Advanced Mineralogy (6L; 6L)
F. A. Campbell

Geology 511. (111.) Regional Structural Geology (3-0; 0-0)

Geology 512. (112.) Pleistocene Geology (0-0; 3-0)

Geology 513. (113.) Field Work in Geomorphology and Glacial Geology
One day of field work each week (½-year course)

Geology 514. (114.) Rock Analysis

Geology 609. (109.) Geological Research
Members of the Department

HISTORY

1. Students contemplating graduate work in History should direct their enquiries to the Head of the Department.
2. The Department offers instruction leading to the Ph.D. in the following fields: Canada in the 17th and 18th centuries; the Canadian West; the American West. The attention of prospective candidates is directed to the general regulations for the degree on page 452 of the calendar. Individual programs will be arranged in consultation with the Department.
3. Instruction leading to the degree of Master of Arts is offered in the standard fields of British, European, Canadian and American history. The Department especially invites inquiry from qualified students who wish to do research in the following fields:
   (1) Medieval England
   (2) France
   (3) Russia
   (4) Reformation Europe
   (5) Canada under the French Régime
   (6) The Canadian West
   (7) The American West

   The Rutherford Library affords facilities for some advanced work in these fields. Its resources include the Woods Collection of *Americana* and the Rutherford Collection of *Canadiana.*

   Students who wish to do advanced work in other fields should consult the Head of the Department.
4. Far the Master of Arts degree, an honors graduate in History will ordinarily be required to complete two courses, History 600 and History 602, in addition to his thesis. Additional courses may however be required. A student with a pass degree, provided he has had at least four senior History courses, will be required

to take at least four Graduate courses in History in addition to History 600 and History 602. All candidates for the Master's degree must in addition carry out research in a chosen field of investigation under the direction of one or more members of the Department, and embody the results in a thesis. A reading knowledge of a modern language other than English, ordinarily French or German, will be required of all candidates. For specialization in some fields a working knowledge of other languages will be necessary.

5. A number of graduate scholarships are available. For terms of award, see pages 544-550. Smaller sums are available within the Department for readers.

6. Courses in other Departments may, with the approval of the Department, be taken in graduate programs in History. Courses not at the Honors and Graduate level may in some circumstances be taken by graduate student, but not normally for credit.

7. The Honors graduate may expect to complete the requirements for the Master of Arts degree in one year; the graduate with a pass degree will require at least two years. Full-time attendance for at least one academic year is required. No extramural courses are offered and no Graduate courses are offered in the Summer Session or the Evening Division.

8. A limited number of the graduate courses listed below are available each year.

History 502. (108.) Medieval Europe (3-0; 3-0)

History 504. (110.) The Age of Louis XIV (3-0; 3-0)

History 506. (111.) The Age of the Enlightenment (3-0; 3-0)

History 508. (112.) The French Revolution (3-0; 3-0)

History 510. (113.) Europe 1815 - 1870 (3-0; 3-0)

History 512. (114.) Europe since 1870 (3-0; 3-0)

History 514. (109.) The West Slavic Peoples since 1800 (3-0; 3-0)

History 516. (115.) Russia since 1861 (3-0; 3-0)

History 518. (125.) Slavonic and Soviet Studies: an interdepartmental seminar.

History 520. (116.) Medieval Britain (3-0; 3-0)

History 522. (117.) England under the Tudors and Stuarts (3-0; 3-0)

History 524. (118.) Britain in the 19th century (3-0; 3-0)

History 526. The British Empire and Commonwealth since 1815 (3-0; 3-0)

History 530. (119.) Canada during the French Régime

History 532. (120.) Canada 1763-1867 (3-0; 3-0)

History 534. (121.) The Canadian West (3-0; 3-0)

History 540. (122.) The Westward Expansion of the United States (3-0; 3-0)

History 550. (124.) Latin America

History 560. (123.) The Far East (3-0; 3-0)

History 600. (200.) Conference course: open to Graduate students only.
Directed study in special subjects to meet individual requirements.

History 602. (107.) Philosophy of History and Historiography (3-0; 3-0)

Open to graduate students only. Required of all graduate students in History.

MATHEMATICS

1. The Mathematics Department can offer postgraduate courses in a number of fields, including number theory, real variable theory, differential equations, tensor analysis, theoretical physics, differential geometry, modern algebra, and mathematical statistics.
2. Several teaching assistanships, involving up to six hours a week of elementary teaching, are available for candidates working towards a higher degree.
3. Courses taken in other departments will depend upon the field of interest of the candidates. Courses in physics may include 480(53), 470(54), 520(60), 510(101), 550(102), or 570(104), or Astronomy 410.
4. Candidates for the M.Sc. degree are normally expected to submit a thesis in one of the fields mentioned above, with at least two graduate courses, one or both of which must be in the Department of Mathematics.
5. The M.Sc. degree may be taken in a minimum of one year after the Honors degree. Candidates for the two-year program (from a pass degree in the Mathematics pattern) will be required to take at last six courses, with a research project in the second year. They may also be required to write a comprehensive examination at the end of the first year of the program.
6. Candidates for the Ph.D. degree will spend at least two years from the completion of the M.Sc. degree in advanced study and research. The major requirement is a substantial contribution to knowledge, embodied in a thesis.

   The work will be under the general direction of an *ad hoc* committee. A preliminary oral examination will be given at least one year before completion of the thesis.
7. Prospective students should consult both the head of the department and the staff member in charge of the field in which they are particularly interested.

Mathematical Physics

The Master of Science and Doctor of Philosophy degrees in Mathematical Physics may be taken in the Mathematics department by a student with a good background in both Mathematics and Physics. Candidates with an Honors degree in Mathematics will be required to write a thesis on some topic in the field of theoretical, rather than experimental Physics, or in Applied Mathematics.

The program of graduate courses will be selected in consultation with the heads of the departments of Mathematics and Physics.

Candidates who have a B.Sc in the Mathematics pattern of the general course, with three or more courses in Physics, may be accepted for a two-year M.Sc. program in Mathematical Physics. The general conditions of paragraph five above will apply.

Statistics

The Master of Science and Doctor of Philosophy degrees in Mathematical Statistics may be taken in the Mathematics department.

Candidates for the M.Sc. degree with an Honors degree in Mathematics will be required to take at least two graduate courses in theoretical statistics and to write a thesis on some topic in this field.

Candidates with a B.Sc. in the Mathematics pattern of the general course may be accepted for a two-year M.Sc. program if their pattern has included Mathematics 255(45), and Mathematics 450(62) or their equivalent. The general conditions of paragraph five above will apply.

Honor and Graduate Courses

A selection of courses, depending on demand, will be made from the following list:

500.	**(102.) Theory of Functions of a Complex Variable**	(3-0; 3-0)
510.	**(107.) Modern Algebra**	(3-0; 3-0)
515.	**(110.) Number Theory**	(3-0; 3-0)
520.	**(103.) Differential Geometry**	(3-0; 3-0)
540.	**(101.) Theory of Functions of Real Variables**	(3-0; 3-0)
550.	**(104.) Elementary Quantum Mechanics and Special Relativity Theory**	(3-0; 3-0)
522.	**Quantum Mechanics**	(2-0; 2-0)
555.	**(109.) Hydro- and Aero-dynamics**	(3-0; 3-0)
560.	**(106.) Estimation and Statistical Hypotheses**	(3-0; 3-0)
562.	**(111.) Theory of Games**	(2-0; 2-0)
564.	**(114.) Analysis of Variance**	(3-0; 3-0)
570.	**(121.) Probability Theory and Applications**	(2-0; 2-0)
580.	**(105.) Tensor Analysis**	(3-0; 3-0)
600.	**(112.) Analysis. Special Functions**	(3-0; 3-0)
605.	**(113.) Mathematical Logic**	(2-0; 2-0)
610.	**(115.) Calculus of Finite Differences**	(3-0; 3-0)
615.	**(116.) Integral Equations**	(3-0; 3-0)
620.	**(117.) Conformal Mapping**	(3-0; 3-0)
625.	**(118.) Analytic Number Theory**	(3-0; 3-0)
630.	**(119.) Topology**	(3-0; 3-0)
635.	**(108.) Statistical Mechanics**	(3-0; 3-0)
640.	**Advanced Numerical Analysis**	(3-5; 3-5)
650.	**(120.) Selected Topics in Theoretical Physics**	(3-0; 3-0)
651.	**Advanced Relativity Theory**	(2-0; 2-0)
660.	**Stochastic Processes**	(2-0; 2-0)

MEDICINE AND CLINICAL MEDICINE

There are facilities in the Department of Medicine to permit graduate students to proceed to Master of Science degrees. Fellowships are available on an annual basis for suitable candidates. Information on this subject can be obtained by applying to the Head of the Department.

MECHANICAL ENGINEERING

1. The Department of Mechanical Engineering offers graduate work in the field of Applied Mechanics.
2. The normal requirements for a Master's Degree are credit in four full year courses or heir equivalent, two of which must be in the candidate's major field of interest, plus a thesis.
3. Financial assistance is available in the form of part time teaching assistantships. The student should also note the availability of various scholarships listed under Awards and Financial Assistance.
4. *Graduate courses*

E.M. 551. Theory of Elasticity (3-0; 3-0)
G. Ford

E.M. 552.* Dynamics of Structures (0-0; 3-0)
J. S. Kennedy

E.M. 553. Theory of Plates and Shells (0-0; 3-0)
J. S. Kennedy

E.M. 554. Theory of Elastic Stability (0-0; 3-0)
G. Ford

E.M. 555.* Theory of Plasticity (3-0; 0-0)

Mech.E. 520.* Advanced Combustion Engineering (2-3/2; 2-3/2)
D. Panar

Mech.E. 525. Gas Dynamics (3-0; 3-0)
C. M. Rodkiewicz

5. Some senior courses in Mathematics, Physics and Civil Engineering will be accepted as part of the M.Sc. program.

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*To be offered starting 1961-62.

MINING AND METALLURGY

The Department of Mining and Metallurgy is prepared to offer graduate work in the fields of Mineral Dressing, Hydrometallurgy, Pyrometallurgy and Physical Metallurgy. Graduate programs in each of these fields, leading to the degrees of M.Sc. and Ph.D. in Metallurgy, M.Sc. and Ph.D. in Metallurgical Engineering, may be arranged.

Graduates in the basic Sciences or Engineering are eligible to apply.

The Department in recent years has acquired new and enlarged space facilities and much new and specialized equipment has been added.

Fields of interest include a variety of projects in both Physical and Extractive Metallurgy.

Graduate courses offered in the Department are as follows:

Met.E. 500. Metallurgical Thermodynamics
Met.E. 501. Kinetics of Metallurgical Processes
Met.E. 502. Advanced Crystallography
Met.E. 503. Corrosion
Met.E. 504. Flotation

Met.E. 505. Hydrometallurgy
Met.E. 506. Research Techniques in Metallurgy

NOTE: The Department reserves the right to offer only those graduate courses for which a sufficient number of students register.

MODERN LANGUAGES

1. Special fields of interest: French, Spanish, German or Russian *literature* or *linguistics*. Assistantships are available in French, German and Russian. The collections in these fields in the library do not permit work beyond the Master of Arts level in this University.
2. Candidates for the degree of Master of Arts will consult the head of the Department before registering for graduate work. The latter, in consultation with other members of the Department, will plan a special course of study to meet each candidate's needs.
3. Any relevant senior course offered in the University may be taken by a candidate for the Master of Arts degree.
4. *Graduate courses*

French

510. (103.) Seminar in French Composition (3-0; 3-0)
M. FAUCHER

550. Semantics, Lexicography and Linguistic Geography (3-0; 3-0)
E. VON RICHTHOFEN

580. Stylistics as Applied to French Literature (3-0; 3-0)
E. VON RICHTHOFEN

600. (101.) French Medieval Literature (3-0; 3-0)
E. VON RICHTHOFEN

605. Chansons de geste and Romans courtois (3-0; 3-0)
E. VON RICHTHOFEN

610. (107.) The Renaissance (3-0; 3-0)
C. H. MOORE AND M. FAUCHER

612. The Spirit of Humanism in France and England at the Beginning of the Renaissance (3-0; 3-0)
I. SOWTON AND C. H. MOORE

614. Rabelais (3-0; 3-0)
C. H. MOORE

616. Ronsard (3-0; 3-0)
C. H. MOORE

618. Montaigne (3-0; 3-0)
M. FAUCHER

620. The French Moralists (3-0; 3-0)
M. FAUCHER

625. Molière (3-0; 3-0)
M. FAUCHER

630. The Eighteenth Century Novel (3-0; 3-0)
E. J. H. GREENE

634. Marivaux (3-0; 3-0)
E. J. H. Greene

636. Voltaire (3-0; 3-0)
E. J. H. Greene and C. H. Moore

638. Rousseau (3-0; 3-0)
E. J. H. Greene

645. Stendhal (3-0; 3-0)
M. Faucher

648. Literature and the Plastic Arts from the Time of Delacroix and Baudelaire (3-0; 3-0)
M. Faucher

649. Franco-German Literary Relations during the Nineteenth Century (3-0; 3-0)
C. H. Moore

650. Maupassant (3-0; 3-0)
C. H. Moore

651. The Naturalistic Novel (3-0;-3-0)
C. H. Moore

655. The Late Nineteenth Century Theatre
C. H. Moore

665. Valéry (3-0; 3-0)
E. von Richthofen

670. Proust (3-0; 3-0)
M. Faucher

699. (111.) Conference Course
E. J. H. Greene, M. Faucher, C. H. Moore and E. von Richthofen

Spanish

540. History of the Spanish Language (3-0; 3-0)
B. Plaskacz

602. The Poem of the Cid (3-0; 3-0)
E. von Richthofen

605. Early Spanish Prose (3-0; 3-0)
E. von Richthofen

665. Contemporary Spanish Poetry (3-0; 3-0)
E. von Richthofen

670. Modern Spanish and Latin American Novelists (3-0; 3-0)
E. von Richthofen

German

500. Special Reading Course (3-0; 3-0)
J. Szöverffy

510. (107.) Advanced German Composition and Conversation (3-0; 3-0)
A. Arnold

530. (101.) German Medieval Literature and Philology (3-0; 3-0)
J. Szöverffy

540. (103.) Old High German Philology and Literature (3-0; 3-0)
J. Szöverffy

***550. Gothic** (3-0; 3-0)
J. Szöverffy

***560. History of the German Language** (3-0; 3-0)
J. Szöverffy

***570. Survey of Germanic Philology** (3-0; 3-0)
J. Szöverffy

***600. An Introduction to the Study of Lyric Poetry: Goethe's Poems** (3-0; 3-0)
E. Reinhold

***603. German Poetry from the Twelfth to the Nineteenth Century** (3-0; 3-0)
Alison P. Scott

***606. The Development of the German Drama** (3-0; 3-0)
E. Reinhold

***609. Development of the German Novelle, with Emphasis on the Nineteenth Century** (3-0; 3-0)
E. Reinhold

***612. The German Roman from Johann Fischart to Jakob Wassermann** (3-0; 3-0)
A. Arnold

***615. History of German Literature to the Age of Goethe** (3-0; 3-0)
Alison P. Scott

***630. Lessing and the Period of Enlightenment** (3-0; 3-0)
Alison P. Scott

***640. Goethe's Faust and the Faust Legend** (3-0; 3-0)
E. Reinhold

***650. Schiller's Historical Dramas** (3-0; 3-0)
Alison P. Scott

***660. Heinrich Heine and the Young Germany Movement** (3-0; 3-0)
A. Arnold

***670. The German Drama of the Nineteenth Century** (3-0; 3-0)
E. Reinhold

***680. The Life and Works of Gerhart Hauptmann** (3-0; 3-0)
E. Reinhold

***690. Contemporary German Poetry** (3-0; 3-0)
A. Arnold

695. Anglo-German Literary Relations from the Sixteenth to the Nineteenth Century (3-0; 3-0)
E. Reinhold

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*These courses were formerly given as German 115, Seminar Courses (Literature and Philology).

699. Conference Course

MEMBERS OF THE DEPARTMENT

An honors or graduate course designed to meet the needs of indiyidual students. It may include the detailed study of an author, period, genre, or any literary problem not dealt with in the honors or graduate courses listed above.

Russian

540. (115a.) Introduction to Comparative Slavonic Philology (3-0; 3-0)

TO BE ANNOUNCED

600. Early Eastern Slavonic Literature (3-0; 3-0)

O. STARCHUK

640. (115c.) Russian Poetry of the Eighteenth and Nineteenth Centuries (3-0; 3-0)

O. STARCHUK

660. (115i.) The Russian Psychological Novel (3-0; 3-0)

O. STARCHUK

670. Soviet Russian Literature (3-0; 3-0)

O. STARCHUK

699. Conference Course

MEMBERS OF THE DEPARTMENT

PAEDIATRICS

Facilities exist within the Department of Paediatrics for students who wish to proceed to the M.Sc. Degree.

Inquiries should be directed to the Head of the Department of Paediatrics, University Hospital.

PHARMACY

1. The Faculty of Pharmacy offers programs leading to the M.Sc. and Ph.D. degrees and can accommodate a limited number of graduate students in modern well-equipped laboratories. Facilities include an animal room for experimental animals.
2. Research may be undertaken in fields such as: pharmaceutical chemistry, pharmacology, pharmacognosy, and radioactive tracer work. Financial assistance is available from the Canadian Foundation for the Advancement of Pharmacy, and from other sources.
3. Candidates should consult with the Dean regarding the requirements.
4. Undergraduate courses commonly accepted: Biochemistry 400(60), Botany 310 (51), Chemistry 450(52), 372(54), 312(58).
5. *Graduate Courses*

501. (101.) Isotope Tracer Methodology (3-3; 0-0)

B. E. RIEDEL

502. (102.) Radioisotopes (0-0; 3-3)

B. E. RIEDEL

PHILOSOPHY AND SOCIOLOGY

Philosophy

1. Good library facilities are available for the fields shown below.
2. Advanced work may be pursued in any of the following: Ethics, Aesthetics, Social Philosophy, History of Philosophy, Logic and Scientific Method. Graduate students in these fields may compete for the general graduate scholarships listed elsewhere; small sums are also available within the Department for readers.
3. Applicants for the one-year M.A. program in Philosophy must have completed training equivalent to that of graduates with honors in Philosophy from this Department. Applicants for the two-year M.A. program should consult the Department for assessment of the quantity and quality of their undergraduate training in philosophy.
4. The following courses in other departments are commonly accepted as part of the M.A. program in philosophy: Classics 359(50), 355(55), 356(56), and 357 (57); English 372(59); Political Science 310(63); Psychology 382(61); 488(62) or 502(105); Sociology 302(40). Other senior and graduate courses which can be integrated with the specific programs of individuals will also be approved.

Courses in this Department which may be included within M.A. programs in philosophy are: Philosophy 340(52), 342(53), 344(54), 350(55), 352(58), 354(59), 358(60), 360(61), 462(62).

5. *Graduate Courses*

540. (110.) Ancient Philosophy (Advanced Course)

542. (102.) Modern Philosophy (3-0; 3-0)

544 (108.) History of Philosophical and Scientific Thought

546. (111.) Mediaeval Philosophy

548. (109.) Conference Course in Philosophy

550. (105.) Aesthetics (Advanced Course)

554. (104.) Theory of Value

558. (107.) Philosophy of Religion

560. (103) Logic (Advanced Course)

564. Metaphysics

566. (112.) Theory of Knowledge (3-0; 3-0)

568. (113.) Philosophy of Mind

Sociology

1. Fields of specialization presently available for M.A. work in Sociology are: social theory, social psychology, social research, family, and social problems.
2. An adequate library is under development. Opportunities for research in connection with the thesis, as well as research in relation to classwork, are available in the community. Graduate students in the Division of Sociology may compete for the general graduate scholarships listed elsewhere. Small sums are also available within the Division for various kinds of research and reading assistance.

3. In addition to the general requirements for the M.A. degree set forth by the Faculty of Graduate Studies, all applicants for the M.A. in Sociology must:
   (a) Present a good reading knowledge of a language other than English (either French, German, Russian or Spanish) and/or a course in statistics, and
   (b) Pass a comprehensive examination on the general field of Sociology towards the end of their graduate work.
4. Senior courses in Sociology may be included in the graduate program upon recommendation of the Division of Sociology.
5. Senior courses from related fields may also be included in the graduate program upon recommendation of the Division of Sociology.

PHYSICS

1. Programs leading to the M.Sc. and Ph.D. degrees in Physics are open to suitable graduates in Honors Physics, Engineering Physics, or equivalent courses. Individual programs will be arranged in consultation with the Head of the Department of Physics and members of the department. M.Sc. programs can be arranged both in Edmonton and in Calgary.
2. The minimum requirements for the M.Sc. degree are one full year of study and research beyond the level of the Honors B.Sc. degree in Physics. Candidates with deficiencies in this respect will be required to remedy these and to write a comprehensive examination during their first year. The program in the final year will include a minimum of two courses and a research project of sufficient merit to form the basis of a thesis.
3. The minimum requirements for the Ph.D. degree are two full years of study and research beyond the level of the M.Sc. degree in Physics or in Mathematical Physics. The program will include a minimum of two courses and a thesis based on original research. A reading knowledge of two of French, German, Russian, will normally be required.
4. *Theoretical Physics.* The major fields of theoretical research are: Solid state physics, physical acoustics, theoretical nuclear physics, elementary particles, field theory. A digital computer is available for complex numerical calculations.
5. *Experimental Physics in Edmonton.* Research projects are available in the following fields: nuclear physics (with a 2 Mev Van de Graaff generator), low temperature and solid state physics, geophysics, mass spectroscopy, precision optical spectroscopy, microtopography, radiation and medical physics.
6. *Experimental Physics in Calgary.* Research in the following fields is carried on in Calgary: cosmic rays (in association with the Sulphur Mountain Observatory near Banff), biophysics (using electron microscope), magnetic resonance.
7. A number of half-time teaching fellowships are available for graduate students who have no other financial assistance. The stipends vary from $2,100 to $2,400. Inquiries concerning these fellowships should be addressed to the Head of the Department.

   In addition to the above, summer student assistantships to the value of $800 are expected to be available in most research projects. The attention of students is directed to the availability of the various graduate awards listed under "Graduate Awards".

8. The following undergraduate courses are offered regularly, and are available to graduate students in other departments and to students in the two-year M.Sc. program: Physics 440(56), 470(54), 480(53), 510(101), 520(60), 550(102).

9. *Graduate Courses*

516. (105.) Solid State Physics (2-0; 2-0)
S. B. Woods

540. (99.) Advanced Electronics (2-1S; 2-1S)
H. A. Buckmaster

560. (100.) Physical Optics (3-0; 3-0)
K. B. Newbound

570. (104.) Quantum Mechanics (2-0; 2-0)
L. E. H. Trainor

572. Nuclear Physics (2-0; 2-0)
W. K. Dawson

610. (106.) Advanced Course in Theories of the Solid State (2-0; 2-0)
A. B. Bhatia and D. D. Betts

614. (107.) Advanced Thermodynamics and Statistical Mechanics (2-0; 2-0)
H. Grayson-Smith and L. E. H. Trainor

620. (108.) Advanced Problems in Geophysical Exploration (2-0; 2-0)
G. D. Garland and K. Vozoff

622. (115.) Advanced Earth Physics (2-0; 2-0)
G. D. Garland and K. Vozoff

640. Advanced Electromagnetic Theory (2-0; 2-0)
H. Schiff

650. (110.) Special Topics in Theoretical Physics (2-0; 2-0)

658. Applications of Group Theory to Quantum Mechanics (2-0; 2-0)
L. E. H. Trainor

660. (103.) Atomic Theory and Spectroscopy (2-0; 2-0)
K. B. Newbound and J. H. Harrold

664. (113.) The Production and Optics of Free Elementary Particles and Ions (2-0; 2-0)
C. E. Challice
(Given in Calgary)

670. (109.) Advanced Quantum Mechanics (3-0; 3-0)
H. Schiff

672. (111.) Theoretical Nuclear Physics (3-0; 3-0)
J. T. Sample

674. (112.) Radiation Physics (2-0; 2-0)
D. B. Scott

678. (114.) Cosmic Radiation (2-0; 2-0)
B. G. Wilson
(Given in Calgary)

PHYSIOLOGY AND PHARMACOLOGY

1. Facilities are available for graduate training and research leading to the MS.c. degree in either discipline. The laboratory is adequately equipped for work in the fields of cardiovascular physiology and pharmacology, neurophysiology, temperature regulation, haematology and certain aspects of biophysics, endocrine, respiratory and general physiology. A research program leading to the Ph.D. degree can be provided in certain of these fields.
2. A program has been arranged for graduates in Medicine wishing to spend a year in a basic science department. The program includes graduate courses, a weekly seminar, duties as class laboratory demonstrator, participation in a research project and optional attendance at undergraduate lectures; either physiology or pharmacology may be stressed, as the candidate chooses. This training does not lead to a degree, but may satisfy some of the course requirements for an M.Sc. should the candidate later decide to undertake a research project leading to a thesis.
3. The M.Sc. program can be entered by graduates in Arts and Science, in which case the period before submission of the thesis will normally be two years, and by graduates in Medicine or Dentistry, in which case the period will normally be twelve months. In either case a comprehensive knowledge of the elements of physiology and pharmacology (with emphasis on one or the other) must be demonstrated before submission of the thesis. A program in either case will include graduate courses, participation in a weekly seminar, a limited amount of teaching experience, optional attendance at undergraduate lectures and pursuit of an approved research problem.
4. Prerequisite courses can be specified only at the time of arrangement of the candidate's program, although some biological sciences should have been studied. The requisites of prime importance are a good academic standing and a desire to study biological function.
5. A modest financial support of a candidate can usually be arranged, and this is aided by early application by the student.
6. Graduate and undergraduate courses offered by the Departments of Anatomy, Biochemistry, Chemistry and Physics may be included in the candidate's program.
7. Two Teaching Fellowships are available to graduate students; applications for these should be received before March 15 of each year.
8. *Graduate Courses*

Physiology

501. (101.) Reflex activity of the cardiovascular system* (3-0; 0-0)
J. W. Pearce and Staff

502. (102.) Methodology in physiology (0-3; 0-3)
Staff

503. (103.) The nerve impulse and synaptic transmission* (3-0;0-0)
J. W. Pearce and Staff

504. (104.) Physiology of the adrenal and thyroid glands* (0-0; 3-0)
E. O. Hohn and Staff

505. (105.) Advanced physiological techniques** (1-6; 0-0)
C. Heath and Staff

506. (106.) Tutorial and reading course (1-3; 0-0)
STAFF

600. (200.) Seminar (0-0; 1s-0)
STAFF

Pharmacology

501. Tutorial and reading course (Credit 4 hrs.)
STAFF

502. Methodology in Pharmacology (0-3; 0-3)
STAFF

503. Bioassays* (0-0; 1-6)
C. W. NASH, C. N. GILLIS AND J. D. TAYLOR

504. Pharmacological aspects of autonomic transmitted substances*
C. W. NASH, C. N. GILLIS AND J. D. TAYLOR

*Offered every second year.
**Offered if registration sufficient.

PLANT SCIENCE

1. Facilities. The Department has excellent facilities for research in the various fields. These include greenhouse, growth chamber and field accommodation for growing, handling and storage of plant material. Laboratories have modern equipment and instruments for specialized studies in biochemical, cytological, ecological, genetical, pathological and physiological investigations.
2. Cytogenetical and genetical studies are under way with a number of crop plants. Considerable work is under way with antibiotics and certain agricultural chemicals as they affect host-pathogen relationships in the field of plant pathology. Plant growth regulators and other compounds are studied under field and laboratory conditions especially as they affect weed control and crop production. Investigations are continuing on various fundamental aspects of quality in crops and on biochemical materials and physiological processes. Basic studies are under way in various phases of production of forage crops and horticultural crops.

   Assistantships are available in a number of projects from money provided by various grants or from the University.
3. Applicants who are considered satisfactory on the basis of general admission regulations, may be admitted for graduate work in Plant Science provided adequate facilities and space are available for the project they propose to undertake. Graduate students are not required to take a foreign language for the Master's degree, but they are advised to do so if they contemplate going on to the doctorate.
4. *Undergraduate courses commonly accepted.* Normally all courses listed as senior are acceptable on the graduate program. It should be emphasized that course outlines are normally based on the student's previous training and anticipated needs in the field he has chosen.
5. *Graduate Courses*

Plant Science

500. (200.) Seminar in Plant Science (1s-0; 1s-0)

Biometrics

603. (103.) Experimental Design (2-2; 2-2)
L. P. V. JOHNSON AND W. E. SMITH

Field Crops

503. (101.) Reading Projects in Field Crops Max. of 6 hrs. credit
W. E. SMITH

504. (102.) Research Projects in Field Crops Max. of 6 hrs. credit
W. E. SMITH

Genetics

505. (101.) Reading Projects in Genetics and Plant Breeding
Max. of 6 hrs. credit
GENETICS STAFF

506. (102.) Research Projects in Genetics and Plant Breeding
Max. of 6 hrs. credit
GENETICS STAFF

Genetics

530. Microbial Genetics (0-4; 0-4)
J. WEIJER

611. (111.) Cytology and Cytogenetics (2-3; 2-3)
J. UNRAU, G. W. R. WALKER AND J. KUSPIRA

612. (112.) Advanced Genetics (2-1a; 2-1a)
L. P. V. JOHNSON AND W. E. SMITH
(Not offered in 1960-61).

Horticulture

507. (101.) Reading Projects in Horticulture Max. of 6 hrs. credit
STAFF

508. (102.) Research Projects in Horticulture Max. of 6 hrs. credit
STAFF

509. (103.) Selected Topics in Horticulture Max. of 6 hrs. credit
STAFF

Plant Ecology

501. (101.) Reading Projects in Plant Ecology Max. of 6 hrs. credit
WM. G. CORNS

502. (102.) Research Projects in Plant Ecology Max. of 6 hrs. credit
WM. G. CORNS

Plant Pathology

511. (101.) Reading Projects in Plant Pathology Max. of 6 hrs. credit
A. W. HENRY

512. (102.) Research Projects in Plant Pathology Max. of 6 hrs. credit
W. P. SKOROPAD

631. (131.) Advanced Plant Pathology (0-3; 0-3)
A. W. HENRY AND W. P. SKOROPAD

Plant Physiology and Biochemistry

513. (101.) Reading Projects in Plant Physiology and Biochemistry
Max. of 6 hrs. credit
A. G. McCalla and Saul Zalik

514. (102.) Research Projects in Plant Physiology and Biochemistry
Max. of 6 hrs. credit
A. G. McCalla and Saul Zalik

520. (120.) Plant Morphogenesis (2-2; 2-2)
Saul Zalik

POLITICAL ECONOMY

1. Graduate work in the department may be undertaken in either Economics or Political Science. Economics embraces the various branches of economics, including agricultural economics. Political Science embraces the various branches of the study of the theory and organization of governments.

2. *Economics*

A candidate for the two-year M.A. degree must fulfil the following requirements before being admitted to the M.A. program:

Obtain standing in at least *four* Economics courses at this University or their equivalent at another university. Three of these must be senior courses.

Political Science

As above, except that the phrase Political Science should be substituted for the phrase Economics.

3. *Graduate Courses*

500. (102.) Modern Economic Theories (3-0; 3-0)
501. (101.) History of Economic Theory (3-0; 3-0)
502. (105.) A General Reading and Seminar Course (3-0; 3-0)
601. (120.) Advanced Economic Theory (3-0; 3-0)
611. (121.) Economic Development (3-0; 3-0)
613. (131.) Economic Geography (3-0; 3-0)
621. (124.) International Economics (3-0; 3-0)
631. (125.) Labor Problems (3-0; 3-0)
641. (126.) Monetary Theory and Policy (3-0; 3-0)
651. (127.) Public Finance and Fiscal Policy (3-0; 3-0)
653. (130.) Transportation and Public Utilities (3-0; 3-0)
661. (128.) Agricultural Economics (3-0; 3-0)
663. (132.) Agricultural Marketing (3-0; 3-0)
671. (129.) Business and Government (3-0; 3-0)
681. (122.) Business Cycle Analysis (3-0; 3-0)
691. (123.) Comparative Economic Systems (3-0; 3-0)

Political Science

600. (120.) Political Institutions (3-0; 3-0)
610. (121.) Political Theory (3-0; 3-0)

621. Government of Canada (3-0; 3-0)
651. (123.) Public Administration (3-0; 3-0)
661. (122.) International Politics (3-0; 3-0)

PSYCHOLOGY

1. Local hospitals are available for observation and testing; industrial and military contacts have also been established. An extensive library of group, performance and projective testing materials is maintained. There is a small laboratory with animal room attached, limited equipment on hand, and facilities for local construction of apparatus for research.
2. Fields of specialization are: Clinical Psychology, General and Experimental Psychology, Industrial Psychology, Military Psychology, Social Psychology. Students in these fields may compete for the general graduate scholarships listed elsewhere; National Research Council scholarships are open to students of psychology; the Henry Marshall Tory Memorial Scholarship is open to students in this Department. Research assistantships are occasionally available under grants for specific research projects; small sums are always available within the Department for readers.
3. Applicants for the one-year M.A. program in psychology must have completed eight courses in psychology. Applicants for the two-year M.A. program must have completed four courses in psychology and one in philosophy or sociology. Applicants for the M.Sc. programs in psychology must have a B.Sc. with comparable training in psychology and must be specializing in general and experimental psychology.
4. The following courses in other departments are commonly accepted as part of the M.A. program in psychology: Education 570, 572; Mathematics 255(45); Philosophy 240(40), 352(52), 354(54), 360(61), 462(62), 568(113); Physiology 462(62); Political Economy 330(65); Sociology 510(54), 326(55), 380(60), 510(101), 542(103). Other senior and graduate courses which can be integrated with the specific programs of individual students will also be approved.
5. Courses in this Department which may be included within M.A. programs in psychology are: Psychology 340(52), 382(62), 430(63), 460(59), 488(61).
6. *Graduate Courses*

502. (105.) History of Psychology (3-0; 3-0)
D. E. SMITH
504. (106.) Conference Course in Psychology
520. (113.) Seminar in Industrial Psychology (3-0; 3-0)
530. (109.) Research in Psychometrics (3-3; 3-3)
534. Experimental Design (3-3; 3-3)
536. (107.) Clinical Psychometrics (3-3; 3-3)
D. SPEARMAN
538. (116.) Advanced Clinical Psychometrics (3-3; 3-3)
540. (115.) Seminar in Social Psychology (3-0; 3-0)
542. (117.) Research in Personality and Social Psychology (3-3; 3-3)
560. (104.) General Experimental Psychology (Advanced) (3-3; 3-3)

562. (110.) Research in Learning and Memory (3-3; 3-3)
566. (111.) Research in Sensory Processes (3-3; 3-3)
568. (112.) Research in Emotions and Motivation (3-3; 3-3)
572. (101.) Physiological and Comparative Psychology (3-3; 3-3)
580. The Study of the Individual (3-0; 3-0)
584. (114.) Seminar in Personality Theory (3-0; 3-0)
588. (102.) Abnormal Psychology (3-0; 3-0)
D. SPEARMAN
590. (108.) Clinical Psychology and Therapy (3-3; 3-3)
D. SPEARMAN

SECONDARY EDUCATION

1. The work of this Division is closely co-ordinated with that of other Divisions in the Faculty of Education and with the Departments of the Faculty of Arts and Science. The Division is associated also with demonstration and practice schools of the City of Edmonton, and with the Alberta Department of Education. The facilities of all these bodies are, in varying degrees, available to graduate students.
2. The Division provides graduate instruction in history of education, philosophy of education, curriculum and teaching. Graduate programs normally include both professional courses and courses in the liberal arts and sciences.
3. Before a student can be admitted as a candidate for the M.Ed. or higher degree his record must be acceptable to the Faculty of Graduate Studies and to the Division. He should first consult the chairman of the Division who, together with the members of his staff, will plan an appropriate program.
4. The research facilities provided through the Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, are available to graduate students in this Division. The *Alberta Journal of Educational Research* published under supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
5. *Graduate Courses*

Education 500. Education Seminar
STAFF
580. Curriculum Development (3-0; 3-0)
W. WORTH
594. History of Education (3-0; 3-0)
B. E. WALKER
680. Teaching in the Secondary School Max. of 6 hrs. credit
E. W. BUXTON AND STAFF
692. Conference Course in Philosophy of Education Max. of 6 hrs. credit
H. S. BAKER AND STAFF

696. Comparative Education Max. of 6 hrs. credit
H. S. BAKER AND B. E. WALKER

Other suitable graduate courses are listed under Educational Psychology, Educational Administration, and Elementary Education.

SOIL SCIENCE

1. The Department of Soil Science has special research laboratories and facilities in the Agriculture Building and adjacent greenhouses for each of the fields of interest listed below.

   The Alberta Soil Survey occupies quarters in the same building and graduate students have an opportunity to broaden their knowledge by association with the Soil Survey staff.

   Some special apparatus for research is available as follows: spectrophotometer; fraction collector;Van Slyke apparatus; flame photometer; Geiger counter apparatus—for determining radioactive sulphur, phosphorus, etc.; animal rooms for feeding tests with rats, rabbits, etc.; incubation and inoculation chambers; autoclaves; Sharples centrifuge; International subsoil centrifuge; tension and pressure plates for soil moisture studies; Uhland soil core sampler; aggregate analysis equipment; chromotography column.

   The Department has plots on black soil at Edmonton and on grey soil at Breton for field tests, and carries on co-operative fertilizer experiments with farmers over a wide area. A complete line of field equipment is available for plot work with cereal and forage crops.

2. Special fields of interest: soil genesis and classification; soil physics; soil chemistry; soil organic matter; soil microbiology; soil fertility; soil testing. Receiving special attention at present are the following:
   (a) Soil survey problems: mineral and organic composition, weathering, leaching, clay characteristics, cation exchange, etc.
   (b) Soil erosion problems: especially water erosion.
   (c) Soil irrigation problems: especially infiltration studies on solonetzic (hardpan) soils.
   (d) Soil fertility and plant nutrition problems: fertilizer and rotation studies, soil deterioration under cultivation, straw utilization, nitrification, nitrogen fixation, and phosphorus availability.
   (e) Soil organic matter: its chemistry and biochemistry.
   (f) Soil structure problems: especially the value of gypsum as an amendment for solonetzic soils.

   Grants, bursaries and students are available for soil research from the National Research Council, the Province of Alberta, and several large industries interested in crop production and the use of fertilizers. Prospective graduate students are invited to apply for one of these forms of financial assistance. Applications should be directed to the head of the Department of Soil Science.

3. Graduate students who have the necessary training may take work leading to the degree of M.Sc. in Soil Science. Exceptionally well qualified graduates of other universities may be considered as candidates for the Ph.D. degree. Graduate

work in Soil Science, related courses in other departments, and a research project in a field of work covered by the list of Soil Science courses may be selected in consultation with the student's adviser. Students interested in post-graduate work should consult with or write to the head of the Department of Soil Science.

4. Some of the courses in other departments that are commonly accepted for graduate credit include: Bacteriology 400(60), Biochemistry 350(71), 511(101), (102), Botany 320(52), Chemistry 372(54), 312(58), Dairying 465(55), 466(56), Geology 351(51), 454(54), 459(59), Mathematics 304(40), Biometrics 603(103) Physics 341(41), 380(46).

5. Courses in Soil Science which may be accepted for graduate credit: Soil Science 453(53), 454(54), 455(55), 456(56).

6. *Graduate Courses*

Soil Science

501. (101.) Special Topics and Problems Max. of 6 hrs. credit

520. (102.) Chemical Methods as Applied to Research (1-3; 0-0)
D. L. Lynch

530. (103.) Physical Methods as Applied to Research (0-0; 1-3)
J. A. Toogood

631. (131.) Seminar (1-*; 1-0)

SURGERY AND CLINICAL SURGERY

Research facilities are available in the McEachern Laboratory for graduate students who wish to register for the degree of M.Sc. This laboratory is well equipped for all types of experimental work on animals of all sizes. Special facilities are available for projects in the fields of experimental cardiovascular, gastrointestinal, renal and endocrine physiopathology. An adequately equipped isotope laboratory and a biochemical laboratory with technical staff are available in any of the clinical fields to assist the graduate students who wish to carry out a research project in this laboratory.

Inquiries should be directed to the Head of the Department of Surgery, University Hospital.

ZOOLOGY

1. Normal laboratory facilities are available for students proceeding to the M.Sc. degree. The Departmental and Main University Libraries contain adequate source material for graduate students. A reference collection of the invertebrate and vertebrate fauna of Alberta is housed in the Department. The University of Alberta and the Alberta Department of Lands and Forests operate the Alberta Biological Station which serves as a headquarters for summer field work.

2. All phases of wildlife are of interest to this Department and particular emphasis is placed on the study of fish, bird and mammal populations. An annual grant to the Alberta Biological Station is available for the payment of salaries to summer workers at the Station.

3. Students who contemplate proceeding to postgraduate work should consult the Department prior to seeking admission to the Faculty of Graduate Studies.

4. Courses from other departments frequently taken: Bacteriology 360(60), Biochemistry 300(50), Genetics 451(51), Physiology 361(61), Senior Botany and Entomology courses.

5. *Graduate Courses*

Zoology

520. Seminar in Zoology (1-0; 1-0)
STAFF

521. Mechanisms of Evolution (0-0; 3-0)
J. R. NURSALL
(Not offered in 1960-61).

525. Field Course in Zoology
STAFF

529. Special Problems in Zoology (3 hrs. either or both terms)
STAFF

540. Environmental Physiology (1-5; 1-5)
C. P. HICKMAN

555. Wildlife Parasitology (0-0; 3-3)
J. C. HOLMES

562. Conservation Topics (1-0; 1-0)

565. Principles of Conservation and Wildlife Management (3-3; 3-3)
W. A. FULLER AND V. LEWIN

566. Animal Behavior
(Not offered in 1960-61).

580. Histology and Microtechnique (3-3; 3-3)
G. O. MACKIE
(Not offered in 1960-61).

XXI

Awards and Financial Assistance

GENERAL INFORMATION

This Calendar includes a complete list of awards of all kinds and of financial assistance available to students at the University of Alberta, Edmonton and Calgary, as shown in the Table of Contents.

Students of high ability or those who require financial assistance are urged to read carefully the sections of interest to them.

Application forms may be had from the Student Awards Office, Edmonton, or from the Student Counselling Services Office, Calgary. Unless otherwise stated completed applications must be received by the Student Awards Office, Edmonton, by dates as follows:

Matriculants — August 1
Undergraduates — June 15
Graduates — March 1

Where no applciation information is shown, the award is made automatically without applications.

For special information regarding application for Province of Alberta Assistance see the section with that heading.

Publication of Awards is as follows:

Graduating or Graduate Students — Spring Convocations
Undergraduate (automatic awards) — First week of June
Undergraduate (awards applied for) — First week of July
Matriculant (and Undergraduate of Aug. 1 date) — First week of Sept.

In order that awards may be equitably distributed, no student may hold more than one major award in any one year.

All cash awards to matriculants and undergraduates are contingent upon the student proceeding with his university course and are payable only when the student is in actual attendance at the University. Payment of fees is a first charge against such awards.

The University assumes liability for the payment of fellowships, scholarships, bursaries, prizes and other awards only to the extent that gifts from donors, or returns from particular investments for these purposes, will permit.

For further information inquiry should be made to:—

Mr. R. B. Wishart,
Administrator of Student Awards,
Student Awards Office,
University of Alberta,
Edmonton, Alberta.

MATRICULATION AWARDS

Awards by the University of Alberta and the Province of Alberta are listed first. The remainder are listed alphabetically.

University of Alberta Honor Prizes—The Board of Governors of the University offer annually a prize to the value of $50.00 to each student from Alberta high schools entering a degree or diploma course in the University with an average standing in the examination units of matriculation of a least 85%.

University of Alberta Matriculation Scholarships—The University of Alberta has provided three matriculation scholarships which are awarded annually to three matriculating students from the high schools in Alberta other than those eligible for a Tegler matriculation or a Bennett matriculation scholarship, on the following terms:

The scholarships will be awarded to the three students having the highest average standing in the examinations covering the subjects for complete senior matriculation (Grade XII) as prescribed in the course of studies. To be eligible for one of these scholarships a student must have completed the grades from ten to twelve inclusive, in not more than four years, and secured an average mark of at least 80% in all subjects considered as the bases of award.

The scholarships provide for three years' fees in any faculty at the University of Alberta. Any student holding one of these scholarships must make at least second class standing in order to be eligible for the scholarship during the succeeding year.

Application should reach the Administrator of Student Awards by August 1.

University of Alberta War Memorial Scholarships—The War Memorial Fund of the University of Alberta will provide one or more scholarships of $650.00 to be awarded for study in a degree program at the University of Alberta on the basis of scholastic ability and financial need and according to the following priorities: (1) to a son or daughter of a member of the armed forces or merchant navy who lost his or her life during, or as a direct result of, hostilities in the War of 1939-45; or (2) to the son or daughter of a member of the said forces or merchant marine who was seriously incapacitated either physically or mentally; or (3) to the son or daughter of any man or woman who served in any of His Majesty's or Allied forces during 1939-45. Failing the receipt of applications from the above-mentioned groups, consideration will be given to applications from (4) sons or daughters of native or naturalized Canadians domiciled in Alberta.

This scholarship is available to matriculants or undergraduates.

Applications should reach the Administrator of Student Awards by August 1.

Province of Alberta Matriculation Scholarships (The Queen Elizabeth Education Scholarship Fund)—The Province of Alberta, under the Students

Assistance Act, has made possible the establishment of three hundred matriculation scholarships of $100 each to bona fide residents of Alberta. The basis of award is academic attainment provided that the average mark of senior matriculation shall be at least 75%. The scholarships are tenable in the first year at the University of Alberta or in a course of university level at a Junior College affiliated with the University. They are also tenable at an approved college or university when the course being taken is of university level and is not available at the University of Alberta.

The amount of the scholarship may be increased according to the financial need of the student, to a maximum which may in some cases be as high as $1,250.

Apply to Administrator of Student Awards, University of Alberta, as soon as possible after August 1. Applications received after August 30 will be considered in order of receipt. Application must be made on the Provincial Government form.

Application may be made for the basic $100 without evidence of financial need. If the application is for more than $100, the form must be filled in completely in order to indicate the amount of financial need.

The Alberta Hotel Association Scholarships—Forty-three scholarships of the value of $500.00 each will be awarded to matriculants residing outside of Edmonton and Calgary. Ten scholarships of the value of $250.00 each will be awarded to applicants from Edmonton or Calgary who can secure their University course without leaving home. Calgary or Edmonton students who must leave their home city to obtain their desired course may apply for the $500.00 award. The scholarships are awarded on the basis of standing in Grade XII examinations and of financial need.

Application forms may be secured from the Secretary, Alberta Hotel Association, 308 Toronto-Dominion Bank Bldg., 714 - 1st Street, East, Calgary, Alberta, and should be completed and returned to him not later than July 31.

The Alberta Institute of Agrologists Scholarship in First-Year Agriculture, valued at $250.00, will be awarded annually to an applicant from either an Alberta high school or a provincial school of agriculture on the basis of scholastic standing.

Applications should reach the Administrator of Student Awards by August 1.

The Alberta Wheat Pool Bursaries for Rural Students—Two bursaries of $500.00 a year are offered annually to two students from Alberta high schools, one to a student whose home is in the southern half of the province and one to a student whose home is in the northern half of the province. While applications will be considered from students registered in any undergraduate degree program, preference will be given to candidates entering the Faculty of Agriculture. The amount of $500.00 will be paid to each recipient during each of the undergraduate years up to and including five years, provided that he or she maintains an average standing of not less than 65% in each year. These bursaries are open to students whose parents are engaged in farming and who derive their income mainly from farming. The award will be made on the basis of a satisfactory record in the Grade XII examinations for complete senior

matriculation, and of the need for financial assistance. In applying for one of these bursaries the Wheat Pool's field service personnel should be used for reference.

For the purposes of this award the southern half of the province shall be defined as that part of Alberta inclusive of and south of township 44.

Applications should reach the Administrator of Student Awards by August 1.

The Alberta Wheat Pool Scholarships of the value of $200.00 each are offered annually to three students of outstanding merit entering the first, second and third years of Household Economics at the University of Alberta. These scholarships are available to students who have been members of Girls' Garden Club projects. Applications must be submitted to Mr. R. M. Putnam, Deputy Minister, Provincial Department of Agriculture, Edmonton, by August 1.

The American-Marietta Customers Scholarship, valued at $250, is offered by the American-Marietta Company to a student entering the first year at the University of Alberta in Chemistry, Chemical Engineering, or the Secondary B.Ed. Route provided he is majoring in Mathematics or Science.

The award will be made on the basis of the student's high-school record, financial need, and the extent of his participation in extra-curricular activities. Depending upon the holder's record during the first year, the company may decide to renew his scholarship.

Applications should reach the Administrator of Student Awards by August 1.

The Viscount Bennett Prizes and Scholarships—The late Right Honorable Viscount Bennett, P.C., K.C., LL.D., D.C.L., of Calgary and Mickelham, founded a trust to support prizes and scholarships open to students who have resided for at least five consecutive years in Calgary, or within twenty miles of that city, or in Banff National Park.

Twelve scholarships of the value of $300.00 each will be available for competitive award on the basis of academic attainments, provided always that candidates are, in the opinion of the Committee of Award, of good character and possessed of satisfactory personal qualities.

The scholarships may be held in any year and course, but preference may be given to students who have successfully completed one or more years of university work. However, at least three of the scholarships are reserved for matriculants.

Applications from matriculants should reach the Administrator of Student Awards by August 1.

The William Asbury Buchanan Bursary—The annual income of $100..00 from a trust created by the will of the late Senator William Asbury Buchanan will be expended in paying part of the tuition of a student whose home is in the Lethbridge Public School District, the Lethbridge Separate School District or the Lethbridge School Division. Selection of a recipient of this bursary will be made on the basis of intellectual attainment, athletic ability, useful activity in student affairs, and financial need.

The award, which is open to a student in any faculty, is tenable at the University of Alberta for matriculants or undergraduates, and either at this or another university for graduate studies.

Applications should reach the Administrator of Student Awards by August 1.

The Calgary and District Retail Druggists' Association Scholarship of the value of $250.00 is offered to a student of outstanding merit entering first year Pharmacy. The award will be based on the standing in the required subjects of grade 12. The student must have carried out the work of grade 12 in that part of Alberta south of a line from Rocky Mountain House to Red Deer to Coronation, but not including those centres.

The Calgary Canadian Club Scholarship of $100..00 is awarded to a male student from a Calgary high school entering the University of Alberta in Calgary. The student shall have an average mark in the subjects of matriculation of not less than 75% and shall not have qualified for any other major award. Applications for this award should be made to the Secretary of the Canadian Club, Calgary, not later than July 31.

The Calgary Herald Scholarship in Chemical and Petroleum Engineering is valued at $1,000.00 (or $1,100.00 in the event of the winner being a former Calgary Herald carrier.). This scholarship will be awarded, on the basis of the marticulation standing, to a student entering Chemical Engineering or Petroleum Engineering at the University of Alberta whose home is in that part of Alberta south of a line from Rocky Mountain House to Red Deer to Coronation, who matriculates from a school in that area.. The award will be paid in instalments of $300.00 (or $400.00—see above), $300.00, $200.00, $200.00 at the beginning of the four academic years, provided that the holder's average in the first, second and third years shall not fall below 75%.

Applications should reach the Administrator of Student Awards by August 1.

The Calgary Herald Scholarship in Classics. A scholarship of $500.00 is offered to a matriculant who proposes to enter the Honors Classics program at the University of Alberta in Calgary. This scholarship will be awarded on the basis of the matriculation examination in Latin. Additional consideration would be given to an applicant who has Greek 100.

In case no suitable candidate presents himself in any year the scholarships may be awarded on the results of the first year's work in Honors Classics at the University in Calgary.

Apply to Administrator of Student Awards by August 1.

The Canadian Bechtel Limited Bursary in Engineering valued at $600.00 is awarded annually on the basis of evidence of financial need and of matriculation standing to a matriculant from an Alberta high school qualified for ad mission to the first year of Engineering. The bursary is tenable in the first year of Engineering at the University of Alberta.

Applications should reach the Administrator of Student Awards by August 1.

The Canadian Foundation for the Advancement of Pharmacy Bursary of the value of $250.00 is offered annually to a student of outstanding merit entering first-year Pharmacy. Financial need will be considered in making the award.

Applications should reach the Administrator of Student Awards by August 1.

The Canadian Foundation for Poliomyelitis Bursaries are offered to students in the diploma course in Physical Therapy and Occupational Therapy by the Alberta Command, Canadian Legion, B.E.S.L. chapter. Six bursaries at $335.00, will be available, *three for students entering the course from Grade XII,* and *three may be awarded to students entering the second year.* The joint bases of award will be scholastic standing (in the required matriculation subjects of Grade XII or equivalent standing as accepted by the University of Alberta, or the first year of the course) and financial need.

Applications should reach the Administrator of Student Awards by August 1.

The Canadian Freightways Motor Transport Matriculation Bursary—Canadian Freightways offers annually a matriculation bursary of $400 to be awarded to an Alberta student entering first year in the Faculty of Commerce at the University of Alberta in Edmonton or Calgary.

The bursary will be awarded on the basis of evidence of financial need and of a satisfactory record in the Grade XII examinations.

Apply to Administrator of Student Awards by August 1.

The Canadian Legion Scholarship, valued at $400.00 is offered by the Dominion Command of the Canadian Legion, B.E.S.L., for study in a degree program at the University of Alberta on the basis of scholastic ability and financial need, and according to the following priorities: (a) to a son or daughter of a member of the armed forces or merchant navy who lost his or her life during, or as a direct result of, hostilities in the War of 1939-45; or (b) to the son or daughter of a member of the said forces or merchant marine who was seriously incapacitated either physically or mentally; or (c) to the son or daughter of any man or woman who served in any of His Majesty's or Allied forces during 1939-45. Failing the receipt of applications from the above-mentioned groups, consideration wlil be given to applications from (d) sons or daughters of native or naturalized Canadians domiciled in Alberta.

Preference will be given to matriculants or to students who have completed the first year at University.

Applications should reach the Administrator of Student Awards by August 1.

Canadian Mathematical Congress Scholarships in Mathematics.

The Samuel S. Guttman Family Scholarship of the value of $350.00.

The Friends of the Canadian Mathematical Congress Scholarships, one of the value of $500.00 and one of the value of $350.00.

The Haddin, Davis and Brown Limited Scholarship of the value of $250.00.

The above scholarships in mathematics will be awarded to students who have taken all of their Grade XII work at an Alberta high school, have obtained satisfactory standing in this work (including Mathematics 30 and 31), and are entering the first year of a degree program at the University. The awards will be made primarily on the basis of the same special competitive examination in mathematics as that described under the L. T. Melton Scholarship to be written at the time of the Grade XII examinations in June.

The first Scholarship of the Friends of the Canadian Mathematical Congress is to be paid to the over-all winner in this competition.

The Guttman Scholarship will be awarded only to a suitable candidate who registers at the University of Alberta. The other scholarships may go to students who register either at the University of Alberta or at other Canadian Universities. The successful candidates will not be required to pursue the study of mathematics, either at the University of Alberta or elswhere.

Candidates for these scholarships should apply to their high school principals or directly to the Department of Mathematics, University of Alberta, Edmonton, for the necessary form of application, before April 1. The forms should be returned to the Department of Mathematics at the University before April 30.

Canadian Society of Exploration Geophysicists Matriculation Scholarship in Education of $350.00 is offered annually to a male student entering the four year degree course in Education, Secondary Route, with a major in Mathematics or the Physical Sciences. The award will be made on the basis of high standing in Grade XII examinations in Mathematics, Physics and Chemistry.

Applications should reach the Administrator of Student Awards by August 1.

The Canadian Superior Bursary is offered by Canadian Superior Oil of California Ltd., to a male Canadian citizen entering the first year of a course in geology or petroleum engineering. The bursary will cover tuition fees and textbooks for a four year period, provided a satisfactory standing is maintained, and may also include a subsistence allowance when unusual financial need is demonstrated.

The award will be made on the basis of academic standing in Grade XII and financial need. Reference as to character are required.

A change of program from that leading to a career in geology or petroleum engineering, or a failure to maintain an academic standing satisfactory to the Faculty, will entail forfeiture of the bursary.

Application must be made to the Administrator of Student Awards by August 1, of each year in which the bursary is to be held.

The Cardston Pharmacy Scholarship of the value of $100.00 is offered annually to a student of outstanding merit entering first year pharmacy.

The City of Calgary Scholarships—Scholarships of $500.00 each are offered annually by the City of Calgary to Calgary students. Six of the scholarships will be offered to students in any faculty entering their first session, and two to students in any faculty entering their second session. The awards will be made on the basis of proficiency and financial need. The students who win these scholarships will be given free choice in selection of university to be attended.

Written application setting forth the financial ability of the home and other pertinent information should be received by the City Clerk, Calgary, by August 1 on forms available at the office of the City Clerk or the City Comptroller, Calgary.

City of Edmonton Scholarships—Six scholarships of the value of $300.00 each are offered annually by the City of Edmonton, on the basis of acadeimc standing and financial need, to students attending the University of Alberta. Two of these scholarships shall be available to students matriculating into the Univer-

sity and four to undergraduate students entering other years in any faculty. Three of them, one matriculation and two other scholarships, are restricted to students who have attended Edmonton schools from Grade VII to Grade XII.

Written applications should be received by the City Clerk, Edmonton, by August 10. Application forms are available at the office of the City Clerk or the City Comptroller, Edmonton.

The City of Medicine Hat Scholarship—a scholarship of $500.00 will be offered annually by the City of Medicine Hat, on the basis of academic standing and financial need to a student, either male or female, who wishes to attend the University of Alberta. This scholarship will be available to a student matriculating into the University and is not restricted to any faculty. This student must have attended a Medicine Hat School from Grade X to Grade XII. The student's parents must have resided in Medicine Hat during this period. The award will be payable in two instalments, the first applicable to fees at the time of registration, the second payable after the successful completion of the first term's work.

Written application should be received by the City Clerk, City Hall, Medicine Hat before August 1. Application forms, are available at the office of the City Clerk or the City Comptroller's office, City Hall, St. Theresa Academy and Medicine Hat High School.

The Civil Service of Alberta Bursaries—Up to ten bursaries of a maximum of $500.00 a year are offered annually to first year University students from Alberta high schools. These students must be the children of provincial civil servants, retired provincial civil servants or deceased provincial civil servants. The bursaries are confined to matriculants and the amount of $500.00 will be paid to each recipient who finds it necessary to live away from home while $250.00 will be paid to each recipient who can attend the chosen course while living at home. The awards will be made with due regard to geographic distribution. Some of these bursaries are tenable at the Institute of Technology and Art, Calgary.

Application forms may be obtained from the Executive Secretary, Civil Service Association of Alberta, Terrace Building Edmonton, and should be completed and returned to him not later than July 31.

Cominco Undergraduate Scholarships—The Consolidated Mining and Smelting Company of Canada offers annually two four-year awards of $1,400, payable at $350 per annum, and four one-year awards of $250, to matriculants who are sons, daughters or wards of (1) a Cominco employee; (2) a widow whose husband died while regularly employed by Cominco; or (3) a Cominco pensioner or his widow. Applicants must attain an average of at least 75% in the subjects of senior matriculation or the equivalent. Applications are due May 15, and further information and application forms may be obtained from the Secretary, Scholarship Committee, The Consolidated Mining and Smelting Company of Canada Limited, Trail, British Columbia.

The E.I.C. Wives Club of Calgary Scholarship of $100.00 is awarded to a deserving first year Engineering student of the University of Alberta, Calgary, with high entrance standing and who receives no other major award.

The Edmonton and District Druggists' Association Scholarship, of the value of $100.00, is offered annually to a student of outstanding merit entering first-year Pharmacy. The award will be based on the standing in the required subjects of Grade XII. The student must have carried out the work of Grade XII in that part of Alberta north of a line from Rocky Mountain House to Red Deer to Coronation and including those centres.

The Friends of the University Matriculation Bursaries—The Friends of the University have provided two bursaries of $150.00 each, open to students from high schools in Alberta other than those in the city of Edmonton, the City of Calgary or within twenty miles of that city, or in the Banff National Park. To be eligible for this bursary the student must have completed the grades from ten to twelve in not more than four years. The award will be made on the basis of a satisfactory record in the Grade XII examinations for complete senior matriculation and of the need for financial assistance.

Applications should reach the Administrator of Student Awards by August 1.

General Motors Scholarship—Beginning with the autumn of 1955, General Motors of Canada Limited will offer annually one matriculation scholarship to an outstanding student who is entering any course at the University of Alberta. The scholarship may be renewed up to a maximum of four years, providing the recipient maintains a high standard of scholarship (at least 75%). Should the student's scholarship fall below the desired standard the award may be transferred to another qualified candidate who is a member of the same class.

The size of the award will be determined by the recipient's financial need, and may vary from $200.00 to $2,000.00 per year. A grant-in-aid of $500.00 for each scholarship will be paid to the University.

The award is open to any young man or young woman who is a citizen of Canada. The basis of award will be high scholastic standing, personal qualities and financial need. A General Motors Scholar may not hold any other major award.

Applications should reach the Administrator of Student Awards by August 1.

The C. O. Hicks Matriculation Scholarship of $200.00 presented by alumni and teachers, past and present, of Victoria Composite High School will be awarded to a matriculating student who, in addition to academic merit, has shown qualities of good citizenship. This award will be made annually to a student who has attended Victoria Composite High School for at least two years, including the graduating year. One hundred dollars will be given at the beginning of the first year at the University, and one hundred dollars at the beginning of the second year, if the student has satisfactorily completed the first year.

Applications should be made by letter to Mr. H. A. McFarland, Principal of Victoria Composite High School, by September 1 of any year. The applicant must provide proof of academic standing and of admission to the University.

The Inco Scholarship—Beginning with the autumn of 1957 and continuing until the autumn of 1960, the International Nickel Company of Canada, Limited, will offer annually one matriculation scholarship of the value of $300 plus fees,

the total not to exceed $700, to an outstanding student who is entering first year Engineering, or the first year of Geology, Geophysics, Mathematics or Physics at the University of Alberta. The scholarship may be renewed up to a maximum of four years, provided the recipient maintains a high standard of scholarship (at least 75% or standing in the top 20% of the class). In addition each scholarship will include a $500 cost-of-education supplement to the University.

The award will be made on the basis of high scholastic standing in the examinations of Grade XII in Alberta, or their equivalent, personal qualities and financial need.

Applications should reach the Administrator of Student Awards by August 1.

The Imperial Order Daughters of the Empire Matriculation Bursaries—The Provincial Chapter of Alberta, Imperial Order Daughters of the Empire, has provided four bursaries for matriculating students, known as the Coronation Bursaries, of the value of $600.00 each. These are tenable at the University of Alberta and are each made in three yearly payments. Two of the bursaries are reserved for children of men or women who served overseas with the British forces during the Great Wars. All candidates must have resided in the province of Alberta for at least three years prior to application and must not be more than nineteen years of age as at September 1 of the year the award is made. The provincial educational secretary of the Imperial Order Daughters of the Empire will notify the high schools in February of each year, of the impending award, all applications to be in her posession by May 1. Further information and application blanks may be obtained from Mrs. C. B. Linton, 11418 - 101 St., Edmonton, Alberta.

The Imperial Order Daughters of the Empire Second War Memorial Matriculation Bursaries—A number of bursaries for matriculating students are offered annually by the Imperial Order Daughters of the Empire as part of the 1939-45 War Memorial. They are tenable at any University in Canada. At least one bursary will be awarded in each Province and one in the Yukon, provided there are suitable candidates. The awards are of the value of $1,600.00, i.e. $400.00 a year for four years: $500.00 each in the first and second years and $600.00 in the third of a three year course; $350.00 in the first, $300.00 in the second, third and fourth years and $350.00 in the fifth year of a five year course. The continuation of the award is subject to the holder's passing the examinations of each year and satisfying the Provincial Committee of Selection of his or her continued fitness to retain the Bursary.

An application, which must be submitted not later than April 1, must include certified evidence to the fact that the candidate is the son or daughter of a deceased or permanently and seriously disabled member of the Services of the second World War. Consideration will also be given to the applicant's general record and standing in school, physical fitness and circumstances of the family.

Further information and application blanks may be obtained from the provincial educational secretary, Mrs. C. B. Linton, 11418 - 101 St., Edmonton, Alberta.

The Imperial Order Daughters of the Empire Lethbridge Municipal Chapter Bursary of the value of $500.00 is offered annually to a matriculant in memory

of the veterans of both World Wars. This bursary is tenable at the University of Alberta and is payable over a period of three years: $200.00 the first year, $150.00 each year for the second and third years. The bursary is open to application from children of men or women who served with the British Armed Forces during either the First or Second World Wars, and who have attended either the Lethbridge Collegiate Institute or St. Patrick's High School for at least two years prior to making application. The Lethbridge Municipal Education Secretary will notify the High Schools in October of each year of the impending award, all applications to be in her possession by May 1. Further information and application blanks may be obtained from Mrs. David Guild, Municipal Education Secretary, Lethbridge Municipal Chapter, I.O.D.E., Box 458, Lethbridge, Alberta.

The Imperial Order Daughters of the Empire, Garneau Chapter, Edmonton, Bursary of the value of $100.00 is offered annually to a student, resident in Edmonton, who is entering first year of the Bachelor of Education course at the University of Alberta. The award will be made on a basis of academic standing and financial need.

Apply to Mrs. A. S. Hodgson, Education Secretary, I.O.D.E. Garneau Chapter, 10338 - 127 St., Edmonton, by August 1.

The L. T. Melton Real Estate Limited Scholarship in Mathematics of the value of $350.00 will be offered annually for five years beginning with the 1957-58 session..

The scholarship will be awarded to a student entering the first year of the Faculty of Commerce at the University of Alberta. The student will be expected to have satisfactory Grade XII record including Mathematics 30 and 31, but primarily the scholarship will be awarded on the basis of a competitive examination in mathematics, to be set and marked by the Department of Mathematics.

Candidates for this scholarship should apply to their high school principals or directly to the Department of Mathematics, University of Alberta, Edmonton, for the necessary form of application, before April 1. The forms should be returned to the Department of Mathematics at the University before April 30.

The Carl and Nola Nickel Foundation Scholarship in Mathematics, of the value of $400.00, will be awarded to a student completing Grade XII at an Alberta high school and intending to enter a degree program at the University of Alberta. The student must: (a) reside normally in Southern Alberta (south of the northern limits of Red Deer); (b) obtain matriculation standing in the work of Grade XII, including Mathematics 30 and 31; (c) obtain high ranking in a special mathematics examination set and marked by the University and written at the time of the Grade XII June examinations.

Candidates for this scholarship should apply to their high school principals or directly to the Department of Mathematics, University of Alberta, Edmonton, for the necassary form of application before April 1. The forms should be returned to the Department of Mathematics at the University before April 30.

Petrofina Group Western Canada Scholarships—Three scholarships,

The Calvan Consolidated Scholarship

The Canadian Fina Oil Scholarship

The Western Leaseholds Scholarship

will be offered, not necessarily annually, of the value of $700 each per annum for a period up to and including four academic years or to graduation (whichever is the lesser). Continuation of the scholarship will be subject to the maintenance of an academic standing satisfactory to the Faculty concerned. The university will receive an unrestricted grant-in-aid of $250 per year for each scholarship winner in attendance.

Eligibility will be limited to the following with priority being given to categories (a) and (b):

(a) Children or wards of employees or of annuitants, or of deceased employees who died while in Company service—awards may be made in courses leading to an undergraduate degree at any recognized university;

(b) Company employees—awards will be made only for courses related to the oil industry and leading to an undergraduate degree an any recognized university;

(c) Senior matriculants from high schools of Alberta or Saskatchewan—awards will be made only for courses in geology, petroleum engineering, chemical engineering and geophysics, and leading to an undergraduate degree at the University of Alberta or the University of Saskatchewan.

(d) Undergraduates—consideration may be given for worthy undergraduate students who have already completed one or more years in one of the courses and universities detailed in (c).

The bases of award, except under (d), will be 70% in the final high school examinations, evidence of financial need, general character and personal qualities.

The Company will give careful consideration to the provision of summer employment at going rates for scholarship holders.

Application forms under (a) and (b) may be secured from the Secretary, Petrofina Group Western Canada Scholarship Committee, Room 322, Bamlett Bldg., Calgary, Alberta, and should be completed and returned not later than July 1.

Applications under (c) and (d) should be made to the Student Awards Office, University of Alberta, by August 1.

The Renkenberger Scholarship—See details on page 511.

St. Hilda's Scholarships—The St. Hilda's Trust Fund will provide annually two matriculation scholarships of $300.00 each for women students entering the Faculty of Arts and Science, University of Alberta in Calgary, and one leaving scholarship of $400.00 for a woman student of outstanding merit in the same faculty who will continue her education at another approved institution.

Preference will be given to any applicant who is a graduate of St. Hilda's School for Girls, or a descendant of any such graduate, or of a graduate of St. Hilda's College. If no suitable candidate applies in this category, applications will be considered from women students from any Alberta high school who are entering or leaving the Faculty of Arts and Science, Calgary.

Applications for the entrance (matriculation) scholarships should reach the Administrator of Student Awards before August 1.

Applications for the leaving scholarship should reach the Administrator of Student Awards by June 15.

The Robert David Sinclair Scholarship in First-Year Agriculture—A scholarship of $150.00 in memory of Robert David Sinclair, late Dean of the Faculty of Agriculture, is offered by his family to a student entering first year in the Faculty of Agriculture.

The scholarship is open to students from schools of agriculture and high schools in Alberta and will be awarded on the basis of scholastic standing.

Applications should reach the Administrator of Student Awards by August 1.

The Steel Company of Canada Bursary of $500 per annum is offered annually to a student entering first year at the University of Alberta, in any degree or diploma course. The bursary will be renewed each year for four years or until the student has completed his or her course whichever is less, provided a satisfactory academic standing is maintained. The financial need of applicants is to be considered. Applicants must be permanent Canadian residents. In addition a grant-in-aid of $500 per annum in respect of each bursary will be paid to the University.

Applications should reach the Administrator of Student Awards by August 1.

The Robert Tegler Matriculation Scholarships—The Robert Tegler Trust has provided three matriculation scholarships which are awarded annually to the three matriculating students, from the high schools in the city of Edmonton, having the highest average standing in the regular examinations covering the subjects for complete matriculation (Grade XII). To be eligible for one of these scholarships a student must be a British subject and have completed the grades from ten to twelve inclusive in not more than four years, with an average mark of at least 80% in all subjects considered as the bases of award. He must also have carried out the work of these three grades in the Province of Alberta and at least the Grade XII work in an Edmonton high school.

The scholarships provide for three full year's fees in any faculty at the University of Alberta. Any student holding one of these scholarships must make at least second-class standing in order to be eligible for the scholarship during the succeeding year.

Applications should reach the Administrator of Student Awards by August 1.

The Robert Tegler Special Scholarships—The Robert Tegler Trust has provided two special scholarships for handicapped students, tenable in any faculty to which the students can be admitted, and available to new students or continuing undergraduates. While due weight will be given to the academic record of candidates, special consideration will be given to their background, financial need, nature of handicap, personal qualities, and other relevant points.

The scholarships may be awarded to the same students a second time, or even throughout the whole undergraduate course if, in the judgment of the committee, progress and other circumstances are such as fully to warrant it.

The value of each scholarship will be equal to the annual fees in the faculty concerned, plus a subsistence allowance of $300.00 for the academic year.

Applications should reach the Administrator of Student Awards by August 1.

The University Women's Club of Edmonton Bursary of $300.00, tenable at the University of Alberta, is open to women students from Alberta high schools only. It is awarded on the basis of academic standing in the June Grade XII examination, provided the student has an average of at least 75% in all subjects considered as the basis of award, and of the need for financial assistance. To be eligible for this bursary a student must have completed the grades from X to XII inclusive in not more than four years.

Applications should reach the Administrator of Student Awards by August 1.

The Union Carbide Scholarship of $500.00 is offered annually to a student from Alberta high schools who, after completion of his University studies, intends to enter business or industry and who is interested in such fields as accounting, administration, advertising, engineering finance, health and safety, industrial relations, international trade and law. In addition a grant of $100.00 is made to the University. The amount of $500.00 will be paid to the student during each of the undergraduate years up to and including four years, provided that he or she maintains an average standing of not less than 65% in each year. The award will be made on the basis of a satisfactory record in Grade XII examinations for complete senior matriculation and of the need for financial assistance. It is expected that the student will further this training by practical experience through employment in industry during summer vacations.

Applications should reach the Administrator of Student Awards by August 1.

The Hon. W. C. Woodward Scholarship of $500 per year is offered annually in competition to sons, daughters and legal dependents of full-time employees, of retired employees, and of employees who died while in the service of Woodward Stores (Edmonton) Limited. It is open to matriculants entering any degree course at the University of Alberta. The bases of award will be scholastic standing in the required subjects of senior matriculation in Alberta or equivalent standing as accepted by the University of Alberta, activity and interest in youth organizations, and outstanding qualities of citizenship, leadership and service.

The scholarship will be renewable each year up to a maximum of five years of undergraduate study, provided that the holder's academic standing and general conduct are satisfactory to the University.

Application forms are available from the Personnel Department of any Woodward Department Store and should be completed and returned to the same Department by July 15.

UNDERGRADUATE AWARDS

The following prizes, scholarships and bursaries are available to students in any faculty of the University:

University of Alberta Honor Prizes—The Board of Goverors of the University offer annually a prize to the value of $50.00 to each undergraduate student in a degree or diploma course who, in the work of the preceding year at the University of Alberta, obtained an average standing of at least 85%. This includes students in the graduating year who return to the University for further studies.

University of Alberta First Class Standing Prizes—The Board of Governors of the University offer annually a prize to the value of $25.00 to each undergraduate student in a degree or diploma course who, in the work of the preceding year at the University of Alberta, obtained an average standing from 80% to 84%. This includes students in the graduating year who return to the University for further studies.

Province of Alberta Undergraduate Scholarships (The Queen Elizabeth Education Scholarship Fund)—The Province of Alberta, under the Students Assistance Act, has made possible the establishment of three hundred undergraduate scholarships of $100 each to bona fide residents of Alberta. The basis of award is academic attainment provided that the average mark of the previous year shall be at least 75%. The scholarships are tenable at the University of Alberta. They are also tenable at an approved college or university when the course being taken is of university level and is not available at the University of Alberta.

The amount of the scholarship may be increased according to the finanacial need of the student, to a maximum which may in some cases be as high as $1,250.

Apply to Administrator of Student Awards, University of Alberta by or before June 30. Applications received after June 30 will be considered in order of receipt. Application must be made on the Provincial Government form.

Application may be made for the basic $100 without evidence of financial need. If the application is for more than $100, the form must be filled in completely in order to indicate the amount of financial need.

University of Alberta War Memorial Scholarships—See details given under Matriculation Scholarships.

The Canadian Legion Scholarship—See details given under Matriculation Scholarships.

The Viscount Bennett Prizes and Scholarships—See details given under Matriculation Scholarships.

Applications from undergraduates should reach the Administrator of Student Awards by June 15.

The Robert Tegler Special Scholarships—See details given under Matriculation Scholarships.

City of Calgary Scholarships—See details given under Matriculation Scholarships.

City of Edmonton Scholarships—See details given under Matriculation Scholarships.

The William Asbury Buchanan Bursary—See details given under Matriculation Scholarships.

The Procter and Gamble Student Bursary Fund, of a total annual value of $1,500, has been set up by the Procter and Gamble Company of Canada, Limited, to benefit students in any Faculty or year who are in need of financial assistance in order to continue their studies. In addition the Company provides annually a grant-in-aid of $600.00 to the University.

Students eligible for grants from this fund must have completed at least one year at the University and have obtained an overall average of 65% or more. They must expect to remain in Canada, and it is hoped that when they are in a financial position to do so they will contribute to the general bursary funds of the University, so that other students in turn may be helped.

Applications should reach the Administrator of Student Awards by June 15.

The Samuel J. McCoppen Bursaries—Under the terms of the will of the late Samuel J. McCoppen, $1,200.00 will be available each year for deserving students who cannot, without some financial assistance, complete a university course. A few bursaries, of amounts depending on the individual circumstances of applicants, will be awarded annually to students *who have completed the first or second year of attendance at the University of Alberta.* The basis of award will be financial need and scholastic standing.

Applications should reach the Administrator of Student Awards by June 15.

The Women's Canadian Club of Edmonton Bursary, valued at $100.00, is awarded annually to a new Canadian undergraduate student who has successfully completed at least one year in any faculty or school at the University of Alberta. For the purposes of this award, a new Canadian is any person who has been resident in Canada for less than five years (whether his native language is English, French or foreign) expect where a previous recipient applies, in which case application may be made beyond the five-year period. The award will be made primarily on the basis of financial need, provided that the applicant has obtained a satisfactory academic record and shows promise for the future. Payment of the award shall be contingent upon the student proceeding with his university course, and shall be made only when the student is in actual attendance at the University. The bursary may be awarded to the same student any number of times if, in the opinion of the Committee on Scholarship and Prize Awards, he fulfills the requirements stated above.

Applications should reach the Administrator of Student Awards by June 15.

The Reg. Lister Trophy and Prize. The trophy and a cash prize of $50.00 will be presented annually to the undergraduate student who, during the previous academic session, lived in the University of Alberta Men's Residences and had the highest academic standing of all students so resident.

The Joseph Dolson Oliver Mothersill Memorial Scholarship of the value of $175.00 is awarded annually to a student selected for outstanding contribution to student life in the University, especially through good citizenship and active support of student government.

The Florence E. Dodd Prize of $50.00 is awarded annually to a woman student selected for satisfactory academic work and outstanding contribution to student life in the University through active participation in extracurricular activities.

Block A Club Athletic Scholarship of the value of $100.00 is offered by the Block A Club to a first year male student deemed outstanding in intercollegiate athletics.

The basis of the award will be athletic achievement and satisfactory academic standing (not less than 65% as determined by all term examinations held prior to Colour Night. The award will be dependent on the student entering the second year at the University of Alberta.

Selection will be made by a committee appointed by the Block A Club.

Prizes and scholarships available in the various faculties are listed below according to faculty.

THE FACULTY OF ARTS AND SCIENCE

The following awards are available to students in the general course and in honors courses:

The Faculty of Arts and Science Gold Medals, provided by an anonymous donor, are awarded annually to the graduating student in the general B.A. program and the graduating student in the general B.Sc. program of the Faculty of Arts and Science who have shown the highest distinction in scholarship.

The Board of Governors of the University Scholarship of the value of $100.00 is awarded to the student with the second highest standing in the first year in Arts and Science, provided that an average of not less than 75% be obtained on the work of the year.

The President's Scholarships—Standard Investments Limited, through the late Mr. Justice H. H. Parlee, donated in 1943 a fund to found and endow the President's Scholarships. Three scholarships of the value of $350.00 each are provided. For the present these scholarships are open to competition by students in Mathematics, Physics, the Humanities (including the Fine Arts), and Public Affairs (a program based on history, political economy and law). Proficiency in studies is the primary basis of award, but personal qualities and evidence of serious purpose are also considered. If the number of well qualified candidates exceeds the number of scholarships available, financial need will be taken into account in making the awards.

Candidates should apply to the Administrator of Student Awards by June 15.

The R. L. King Memorial Scholarship in Journalism of the value of $500 is offered annually by Dr. Ben King in memory of his father, to a student entering

the third year of a general course in the Faculty of Arts and Science who is interested in a career in journalism. The scholarship is renewable for a second year if the holder is registered in a course at a recognized University School of Journalism. The basis of the award will be the applicant's academic standing (which must not fall below 65%), general interests, and journalistic experience, if any.

Apply to Administrator of Student Awards by June 15.

The Kenneth William Moodie Scholarship—As a memorial to her nephew, Flying Officer Kenneth William Moodie, a graduate in science of the University of Alberta who lost his life in May, 1942 while on operations, the late Miss Marion E. Moodie made provision in her will for an annual scholarship of $150.00 to a student of outstanding merit entering the first year of the Faculty of Medicine or the third year of the B.Sc. program in the Faculty of Arts and Science. The basis of award will be academic attainment on the previous year's standing at the University of Alberta, financial need and evidence of satisfactory personal qualities.

Applications should be received by the Administrator of Student Awards by June 15.

St. Hilda's Scholarships—Restricted to the University in Calgary. See details given under Matriculatio Scholarships.

Undergraduate applications should reach the Administrator of Student Awards before June 15.

The Sunwapta Broadcasting Company Scholarship, of the value of $200 is offered by Mr. G. R. A. Rice to an outstanding student who is interested in the field of communications, as related to the Broadcasting and Television industry.

The award will be made to a student entering the fourth year in Engineering Physics (Electronics pattern), Electrical Engineering, or Honors Physics, or to a student entering the third or fourth year of a B.A. course who has displayed an active interest in student journalism, or in broadcast script writing. The basis of the award will be academic achievement in the work of the preceding session, particularly (in the case of Science students) in the courses directly concerned with electronics, or (in the case of Arts students) in senior English courses.

Students who wish to be considered for this scholarship should apply to the Administrator of Student Awards before June 15.

The Renkenberger Scholarships, of the value of $250 per year, provided under the terms of the will of the late Harvey Rekenberger of Barons, Alberta, will be awarded to a student who is especially interested in cooperative marketing. The selection will be based on academic record, ability in public speaking and participation in youth and cooperative activities.

The recipient must include at least one senior course in economics in his program of studies, preferably in agriculaural economics or marketing, and must advance the principles of cooperation, on the conclusion of his university studies, as far as lies in his power.

The scholarship is open to students in any year in the Faculties of Agriculture, Arts and Science, Education, or Commerce. Subject to satisfactory progress, the award may be renewed year by year for a period not exceeding four years in all.

Applications should reach the Administrator of Student Awards by August 1.

The Edmonton Section of the Council of Jewish Women offers annually a scholarship of the value of $100.00 to the student who takes the highest standing in the work of the first year of the Faculty of Arts and Science, provided that an average of not less than 75% be obtained on the work of the year.

The University Women's Club of Calgary Scholarship of $200.00 tenable at the University of Alberta is open to women students at the University of Alberta in Calgary who have completed the first year of Arts and Science. To be eligible for the scholarship a student must have an average of at least 75% on the year's work.

The Friends of the University Bursaries in Arts and Science—The Friends of the University have provided two bursaries of $100.00 each open to students who have completed the first two years and are entering the third year of the B.A. or B.Sc. courses in the Faculty of Arts and Science. The awards will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Hudson's Bay Company Merchandising Awards in Arts and Science—See under Other Forms of Financial Assistance.

The following awards are open only to students in honors courses:—

The Governor-General's Gold Medal is awarded by His Excellency the Governor-General to the graduating student in the honors course in the Faculty of Arts and Science who has shown the highest distinction in scholarship.

The Lieutenant Governor's Gold Medal is awarded annually by His Honor, the Lieutenant Governor of Alberta, to the graduating student in the honors course of the Faculty of Arts and Science with the highest distinction in scholarship in that one of the two B.A. and B.Sc. degree programs in which the Governor General's medal was not awarded.

The James McCrie Douglas Memorial Scholarship, valued at $350.00, is available to a male student of outstanding merit who is entering the fourth year of an honors program in the Faculty of Arts and Science. The right is reserved to withhold the scholarship in any year if there is no candidate of sufficient merit.

The Mary Cameron Douglas Memorial Scholarship, valued at $350.00, is available to a woman student of outstanding merit who is entering the fourth year of an honors program in the Faculty of Arts and Science. The right is reserved to withhold the scholarship in any year if there is no candidate of sufficient merit.

The Edmonton Lodge of B'nai B'rith Scholarship, of the value of $100.00, is awarded to the student with the highest standing in the second year of the honors course. The record of the student in the first year will also be taken into account.

Awards in the Departments of the Faculty of Arts and Science

(**Note:** Awards in specified courses are open to students of other faculties registered in these courses.)

Botany

The J. E. Olsen Prize, of the value of $35.00, is offered to the graduating student who has taken the highest average mark in two or more senior botany

courses, provided that the student's general record is satisfactory to the Faculty Council.

Chemistry

The Professor Osman James Walker Memorial Scholarship is awarded annually to the student selected by the Department of Chemistry who is graduating from the University of Alberta in the general or honors program and who will be proceeding to graduate work in the Department of Chemistry at the University of Alberta. Applications for this award must be received by the Department before May 1.

In the event that no suitable applicant is selected, the award will go to the student graduating with the highest record in the fourth year of the honors chemistry program.

The Cave and Company Ltd., Scholarship in Chemistry of the value of $150 is awarded annually to a student selected by the Department of Chemistry who is graduating from the University of Alberta in the general program or honors program or in Chemical Engineering, and who will be proceeding to graduate work in the Department of Chemistry at the University of Alberta. Applications for this award must be received by the Department before May 1.

In the event that no suitable applicant is selected, the award will go to the student in the third year of the honors Chemistry program, with the highest academic standing.

The Chemical Institute of Canada Prize in Chemistry of the value of $25.00 in books is awarded annually to the student in Honors Chemistry who obtains the highest standing in the work of the third year, provided that the student's general record is satisfactory to the Faculty Council.

The Lehmann Prize in Chemistry, of the value of $15.00 in books, is offered annually by the estate of the late Dr. A. L. F. Lehmann, formerly head of the Department of Chemistry in the University. It is awarded to the student making the best record in Chemistry 230, provided the student otherwise secures a standing satisfactory to the faculty council and is carrying a full year's work.

The Paul Edward Macleod Memorial Prize in Chemistry of the value of $25.00 was provided by the late Mrs. J. E. A. Macleod, Calgary, in memory of her son, who died while a student of the university. The award will be made to the student obtaining the highest standing in organic chemistry (Chemistry 250) provided the student otherwise secures a standing satisfactory to the faculty council and is carrying a full year's work.

The Fred H. Irwin Memorial Prize in Organic Chemistry—As a memorial to their son, Flying Officer Fred H. Irwin, a graduate in Honors Chemistry of the University of Alberta, May 19, 1941, who lost his life March 19, 1945, while on operations, Mr. and Mrs. Leslie H. Irwin have made provision for an annual prize of $25.00 in professional books to be awarded to the student making the best record in Chemistry 550.

The Dr. O. J. Walker Memorial Prize, of $25.00 in books, is offered by the Alumni of Phi Delta Theta Fraternity to a student of outstanding merit in Chemistry 312 (Quantitative Analysis), provided the student secures satisfactory standing in his other courses and is carrying a full year's program.

Classics

The Ahepa Prize in Greek—A prize of $50.00 is offered by the Anglo-Hellenic Association in Western Canada to the student in Greek 200 or Greek 300 who secures the highest standing in a special examination in sight translation from English to Greek and from Greek to English, subject to the provision that the prize be granted to the successful candidate only if he or she continues in a course in senior Greek in the year immediately subsequent to the year in which the prize is won. If there is no suitable candidate from Greek 200 or Greek 300, the Department of Classics may at their discretion award the scholarship to a student in other courses in Greek.

The Senior Greek Prize of $50.00 is awarded to the student who ranks highest in the examinations in Greek 352, 353 or 354, whichever is offered, provided that the student achieves first class standing in the course concerned, and that his record is otherwise satisfactory to the Faculty Council.

The Monica Jones Aamodt Prize in Classics in English 350, of the value of $15.00 in books, is offered annually by the Canada Gamma Chapter of Delta Delta Delta in honor of Mrs. Monica Jones Aamodt, its organizer on this campus. The prize is to be awarded to the student obtaining the highest mark in that course, provided that the standing obtained meets with the approval of the Faculty Council.

English

The Rutherford Memorial Gold Medal is offered in memory of the late Honorable Alexander Cameron Rutherford, and is open for competition to students in the graduating year, reading for honors in the Department of English.

The Aiken Scholarship in English Language and Literature, of the value of $100.00, is the gift of the late Sir James Aiken. It is open to honors students in English at the end of their second or third years and to students in the English pattern entering their final year. The scholarship will be awarded to the student with the best average in all courses after the first year, provided that the student has obtained satisfactory standing in Grade XII English or in its equivalent, not less than 70% in English of the first year, and an average of not less than 70% in all senior English courses. In no English course may a student fall below second-class standing.

The Priscilla Hammond Memorial Scholarship in Honors English, of the value of $450.00, is awarded to the student entering upon his or her final year in honors English who, in the judgment of the Department of English, shows the greatest ability and promise in the field of English scholarship or in creative work in English. The right is reserved to withhold the scholarship in any given year if there is no candidate satisfactory to the department.

The James Patrick Folinsbee Memorial Prize of the value of $100.00 is offered annually to the student in English 396 whose writing shows greatest merit. The student's general University record must be satisfactory to the faculty council.

The Samuel Richard Hosford Memorial Prize, of the value of $15.00 in books, is awarded to the undergraduate student making the best record in English 332.

The Priscilla Hammond Memorial Prize in English 200, of the value of $15.00 in books, is offered annually by Delta Gamma Fraternity, in honor of their first president. It is awarded to the undergraduate student making the best record in English 200, provided that the student is taking a full year's work and passes all subjects.

The Calgary Herald Prize in English 200, of $50.00 is awarded to a student in the University in Calgary for outstanding merit in English 200 providing the student secures first class standing in English 200 and is carrying a full year's work in which his standing is satisfactory to the faculty council.

The Charles James Thompson Memorial Prize in English 220, of the value of $10.00 in books, is awarded to the undergraduate student making the best record in English 210 in the Faculty of Agriculture, provided that the student is taking a full year's work and passes all subjects.

Entomology

The Entomological Society of Alberta Prize—An annual prize of $50.00 is offered by this Society to the student obtaining the highest standing in one or more senior courses in the Department of Entomology. The Award is conditional on a satisfactory general record.

Fine Arts

The Fuller Brush Company Scholarships in Art—Two scholarships of $200.00 each are awarded to students of outstanding merit, who are entering either the second or third year of the Art pattern in the Faculty of Arts and Science, or the third or fourth year of the Faculty of Education, majoring in Art, provided that such students are registered in a full year's program.

The University of Alberta Alumni Prize in Fine Arts of $100.00 is offered annually by the General Alumni Association to the student in the Art Division of the Fine Arts Department who has demonstrated the best progress. Financial need will be considered in making the award.

The Lerner Scholarship in Drama—A scholarship of $100.00 is offered annually by Mr. A. I. Lerner, in memory of his son, Irving Lerner. It is awarded to a student of outstanding merit enrolled in Drama 350 (Advanced Acting). To be eligible, a student must be majoring in Drama in the Faculty of Arts and Science or Education. The payment of this scholarship will be contingent upon the student's entering a further year of training in drama either at the University of Alberta or at another recognized college or university.

The Radio Station CFAC (Calgary) Scholarship in Music Composition, to the value of $100.00, is offered annually to a student registered in one or more courses in Music and who has shown promise in Composition. The scholarship is payable when the student is registered at the University of Alberta or elsewhere in a further course of instruction approved by the Music Division. Applicants must be willing to submit their work for performance arranged by the Music Division. Composition shall remain the property of the applicants. The award may be given more than once to the same student. Applications should reach the Music Division of the Department of Fine Arts by March 1.

The Elizabeth Sterling Haynes Scholarships in Theatre Arts—See Awards Made by Other Institutions.

Geography

The Alberta Geography Prize of the value of $25.00 in books, including a one-year subscription to The Canadian Geographer is offered by Mr. Donald C. Lofquist, M.A., to be awarded annually to the freshman student receiving the highest mark in Geography 201, provided the student is carrying a full year's work and passes in all other subjects.

The Canadian Association of Geographers' Book Prize—An award will be granted annually to the graduating student who has specialized in Geography and who has demonstrated the greatest proficiency in this subject.

Geology

The Association of Professional Engineers of Alberta Gold Medal in Geology is offered to the student with the highest general standing in the final year of Geology. This award may be given to a student graduating in either the three year general course or the four year honor course, provided that an average standing of at least 75% is attained.

The Mobil Oil of Canada Ltd. Scholarship in Geology, consisting of a scholarship of $400 to the student selected and a grant of $400 to the Department in which the student is registered, is offered to a student in honors geology in the Faculty of Arts and Science upon the basis of outstanding merit in his previous academic record, and evidence of initiative and good character. To be eligible a student must be entering the final undergraduate year in geology.

Applications should reach the Administrator of Student Awards by June 15.

The California Standard Company Geological Scholarship, valued at $400.00 is offered annually by the California Standard Company to a student of outstanding merit in geology or geological engineering who is interested in oil exploration or production. The scholarship is tenable in the final year of the student's course.

Applications should reach the Administrator of Student Awards by June 15.

The John A. Allan Memorial Scholarship in Geology of the value of $200.00 is offered annually by the Association of Professional Engineers of Alberta in memory of Professor John A. Allan. The award will be made to the student who obtains the highest average standing in all the prescribed courses of first year Geology.

The Rutherford Memorial Prize in Stratigraphy is offered annually by the Alberta Society of Petroleum Geologists. The prize consists of a volume dealing with the stratigraphy of the plains of Alberta and will be awarded to the undergraduate student who, in the opinion of the Department of Geology, has made the most progress in the study of stratigraphicol geology.

The Prize in Economic Geology, of the value of $25.00, is offered annually by George E. Cole, Past President, Canadian Institute of Mining and Metallurgy, to the student obtaining the highest standing in Geology 458 or 460, provided that the student obtains an average of at least 75% in the subject and is registered in a full year's program.

History

The Hudson's Bay Company Scholarship, valued at $300.00, is awarded to a student of outstanding merit who is entering the third or fourth year of the honors History program or the third year of the History pattern, in the Faculty of Arts and Science. A special condition of the award is that a senior or honors course in Canadian History must be included in the program of study. Applications should reach the Administrator of Student Awards by June 15.

The John Henry Stanley Memorial Prize, of the value of $25.00 in books, is offered annually by Dr. George F. G. Stanley in memory of his father to be awarded annually to the student standing highest in Canadian History, provided this student is taking a full year's work and passes all other subjects.

The Gordon Stanley Fife Memorial Prize, of the value of $25.00, is offered by Professor A. L. Burt, the University of Minnesota, in memory of his former colleague, to be awarded to the graduating student who has taken the highest average mark in two or more senior history courses.

The George Malcolm Smith Memorial Prize of the value of $25.00 in books is offered annually by Professor Emeritus M. H. Long in memory of his former colleague, to be awarded to the student standing highest in Modern European History provided that this student takes first-class standing in the course, is carrying a full year's work and passes in all his other subjects.

The History Club Prize of books of the value of $15.00 is offered by the Hisotry Club of the University of Alberta, to the student making the best record in History 200, provided such student receives first-class standing on the year's work in history and passes in all other subjects.

The A. L. Burt Prize of books of the value of $15.00 is offered by the History Club in honor of its founder, to the student making the highest standing in History 450, provided that the student's general record is satisfactory to the Faculty Council.

The Trenholme Dickson and Letitia S. Dickson Prize of $35.00 is awarded to the student with the highest standing in the field of Canadian History, provided such student has a first-class average in that subject and maintains an otherwise satisfactory standing.

The Morden Heaton Long Prize, of the value of $25.00, is offered annually by his friends. It will be awarded to the student with the highest standing in British History, provided that this student takes a first-class standing in the course, is carrying a full year's work and passes in all his other subjects.

The Calgary Canadian Club History Prize of $25.00 is awarded to the student who achieves the best record in any History course given at the University of Alberta in Calgary, provided that the student is registered in a full program of studies, that his mark in History is not lower than 75% and that he does not qualify for another award in the same subject.

Mathematics

The A. Wyman Memorial Gold Medal in Mathematics is offered by the family of the late Mr. Wyman to the student in the graduating year of the

honors program in Mathematics who secures the highest average standing, provided that the student shall have registered in a full year's program and shall be recommended for the award by the Department of Mathematics.

The Cyril G. Wates Memorial Prize valued at $50.00 and offered by Mrs. Wates will be awarded to a student of outstanding merit in Mathematics 253 (Astronomy), or Physics 410, provided that the student's record is otherwise satisfactory to the Faculty Council.

The James McNish Chalmers Memorial Prize, valued at $50.00 is offered by Miss Clare McKinlay to a student of outstanding merit in Mathematics 255, provided that the student's record is otherwise satisfactory to the Faculty Council.

The Ernest Wilson Sheldon Memorial Prize in Mathematics, of the value of $50.00, is given by Mrs. Sheldon in memory of the late Dr. E. W. Sheldon, Emeritus Professor of Mathematics.

The prize will be given to a student of outstanding merit completing the third year of the honors program in mathematics, provided his general record is satisfactory to the Faculty Council. The award will be based on performance in the mathematics courses of the third year.

The Annie Fefferman Prize in Mathematics to the value of $25.00 in books is offered by the family of the late Mrs. Fefferman to the student making the highest standing in Mathematics 200 or 201 provided that the student's general record is satisfactory to the Faculty Council.

Modern Languages

The Aristide Blais Prize in French—A prize of $25.00, the gift of Senator Blais, is to be awarded annually to an undergraduate fluent in the French language who obtains the highest first-class standing in French 360 or 400. The prize may not be awarded to the same student more than once, and in the event of a student qualifying for the prize a second time it may be awarded by reversion to another student with first-class standing in French 360 or 400.

The Belgian Government Prize of books is offered to the senior student who has the best record in French 360 or 370, providing that the student's record is satisfactory to the Faculty of Arts and Science.

The Minister of Switzerland's Book Prize in French is offered to the student who obtains the highest standing in French 375 or 380, provided that the student secures standing which is satisfactory to the Faculty Council.

The Bronze Medal in French, offered by the French Consul in Edmonton will be awarded to the winner of an essay competition to be held by the Modern Laguages department.

The French Government Book Prize will be awarded to the student with the highest standing in French 200, providing such student's record is satisfactory to the Faculty Council.

The Beauchemin Prize in French valued at $25.00 is offered by Dr. L. O. Beauchemin to the student attending the University in Calgary who achieves the highest standing in French 200, providing such student's record is satisfactory to the Faculty Council concerned.

The German Government Prize in books is offered annually to the two senior students with outstanding merit in German 370 and 400 or 450, whichever is offered, provided that these students obtain an average of not less than 75% in these courses, are carrying a full year's work and have a record satisfactory to the Faculty Council. The prize may not be awarded to the same student more than once.

The Canadian Legion, Norwood Branch, Scholarship in Ukrainian. Five scholarships annually of the value of $100 each, will be awarded to students of outstanding merit, three in Ukrainian 100 and two in Ukrainian 300, provided each student's academic record is otherwise satisfactory.

The Ukrainian Catholic Women's Award in the Ukrainian Language of the value of $100.00 is awarded to the student with the highest standing in Ukrainian 100 provided the student's record is otherwise satisfactory to the Faculty Council.

The French Government Bursary—The Government of the French Republic offers annually to a graduating student a bursary to provide for a year's study in a French university. The award is made by the Cultural Counsellor of the French Embassy in Ottawa on the nomination of the President of the University. Candidates for the bursary must have an adequate knowledge of French. Applications should reach the Administrator of Student Awards by March 15.

Philosophy and Psychology

The MacEachran Gold Medals, one in Philosophy and one in Psychology, offered by Professor Emeritus J. M. MacEachran, will be awarded to the Honors students in the Department of Philosophy and Psychology graduating with the highest standing in the last two years of their course:

(a) the B.A. course, with Honors in Philosophy or with Honors in Philosophy and Greek.

(b) the B.A. or B.Sc. course with Honors in Psychology.

The medals will be awarded only to students who obtain First Class Honors.

The Samuel M. Strong Gold Medal and Prize in Sociology, in memory of the late Dr. Strong, will be awarded to the graduating student with the highest standing in the last two years of the honors program in Sociology. The medal will be awarded only to a student who obtains first class honors.

Physics

The Sam Fefferman Memrial Gold Medal in Honors Physics is offered by the family of the late Mr. Fefferman to an outstanding student in the graduating year of the honors program in Physics. The student must have registered in a full year's program, obtain first class honors in Physics, and be recommended for the award by the Department of Physics.

The California Standard Company Geophysical Scholarship, valued at $400 is offered annually by the California Standard Company to a student of outstanding merit who is entering the third year of honors Physics and Geology, or Engineering Physics (Geophysics option), and who is interested in oil exploration or production.

Applications should reach the Administrator of Student Awards by June 15.

Smalley's Radio Ltd. Bursaries—Two bursaries of $500 each are offered annually by Smalley's Radio Ltd. of Calgary to students who are entering the second or third year of honors Physics, or the third year of Engineering Physics at the University of Alberta. The award will be made on the basis of scholastic standing and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Canadian Legion Scholarship in Physics or Electrical Engineering of $400 is offered annually in the field of Physics or Electrical Engineering.

The terms of award are otherwise the same as for the Canadian Legion Scholarship—see page 11.

Applications should reach the Administrator of Student Awards by June 15.

The Northern Electric Undergraduate Scholarship, which provides an amount not exceeding $500 to cover tuition and general fees and the cost of books for one year, is awarded annually to a student of outstanding merit who is proceeding into the second, third or fourth year of Electrical Engineering, Engineering Physics or Honors Physics. The applicant must be a Canadian citizen or a landed immigrant and must normally have secured an average of at least 75% on the work of the preceding university year. Students who have held the scholarship previously are free to apply for renewal of the award.

Applications should reach the Administrator of Student Awards by June 15.

Political Economy

The Duncan Alexander MacGibbon Gold Medal in Political Economy is awarded to the student registered in the department as an honors student in either Economics or Political Science who receives the highest average standing in four courses in either Economics or Political Science. In the case of Economics, one of the courses must be in economic theory, and in the case of Political Science, one of the courses must be in political theory.

The Men's Economics Club Prize, of the value of $10.00 in books, is offered to the student taking the highest standing in Economics 200, provided such student's academic record is satisfactory to the Faculty Council.

THE FACULTY OF AGRICULTURE

The Alberta Institute of Agrologists Gold Medal is offered annually primarily on the basis of scholarship as shown in the two senior years in the undergraduate courses in Agriculture, the weighted average in all subjects to be not less than 75%. Consideration will be given as well to qualities of leadership, personality and character.

The Board of Governors of the University Scholarship of the value of $100.00 is awarded on the basis of the work of the first year in Agriculture, provided that an average of not less than 75% be obtained on the work of the year.

The Dan Baker Scholarships are provided under the terms of the will of the late Dan Baker of Edmonton, Alberta, which founded a trust to provide scholarships in the Faculty of Agriculture. The Scholarships are open either to undergraduates who have completed at least one year of their course or to agriculutral graduates of the University of Alberta who are carrying on research leading to a postgraduate degree in the Faculty of Graduate Studies at the University of Alberta.

The Scholarships are available only to students who could not pursue their studies without financial aid and who are of such ability and acadeimc standing as to be worthy of assistance. Such matters as personality, character, and other relevant points will also be taken into account in making the award.

Two scholarships of the value of $300.00 each will be available. Applications should reach the Adminstrator of Student Awards by June 15.

Loveseth Limited Scholarships in Agriculture—Four scholarships of $250.00 each are offered annually by Loveseth Limited to students of outstanding merit entering second, third, or fourth year Agriculture at the University of Alberta.

The Alberta Dairymen's Association Scholarship in Dairying of the value of $500.00 is open to undergraduates who have completed the second year in the Faculty of Agriculture and who are registered in a special program in the Department of Dairying. The award will be for scholarship attainment during the first two university years with a two-year average of not less than 65%. The scholarship may be renewed during the fourth year for continuel meritorious work.

The Alberta Dairymen's Association Summer Work Awards. Two awards of the value of $150 each are available annually to students who express an intention to specialize in Dairy Science and who, within the previous three years, have completed a summer's work in the dairy industry. These awards are available to students entering the first, second and third years in Agriculture.

The Canada Packers Scholarship, valued at $500, is offered annually to a student entering the fourth year of Agriculture at the University of Alberta. While preference may be given to a student majoring in a field of general interest to the packing industry, all students with high standing in the work of the third year will be eligible.

The Canadian Feed Manufacturers' Association (Alberta Division) Scholarship valued at $150.00. This scholarship is to be made available to a third year student in Agriculture who has decided to major in nutrition in the Department of Animal Science and who has enrolled in an appropriate option in the third year. The scholarship is to be awarded to the eligible student who has the highest weighted average in courses completed during his second year in the Faculty of Agriculture.

The Alberta Branch of the Canadian Seed Growers' Association Scholarship valued at $150.00. This scholarship is made available to a third year student in Agriculture who hase decided to major in the Department of Plant Science and who has enrolled in an appropriate option in the third year. The scholarship is

to be awarded to the eligible student who has the highest weighted average in courses completed during his second year in the Faculty of Agriculture.

The Robert Gardiner Memorial Scholarships are offered by the United Farmers of Alberta in memory of the late Robert Gardiner.

The scholarships are open only to students from farm homes; preference will be given to students born in Alberta.

One scholarship to the value of $100.00 will be awarded to the student standing highest in the third year in the Faculty of Agriculture. A weighted average of 75% in all subjects will constitute the minimum scholastic requirement. In addition to academic standing, consideration will be given to qualities of leadership, personality and character. Application for this scholarship is not required.

One research scholarship to the value of $100.00 will be open to members of the graduating class or to graduates who are proceeding to postgraduate work in Agriculture in the Faculty of Graduate Studies, University of Alberta. Applications should reach the Administrator of Student Awards by March 1.

The Renkenberger Scholarship—See details on page 511.

The Ketchum Prize in Animal Science, valued at $50.00, is offered by the Ketchum Manufacturing Co. Limited of Ottawa. It will be awarded to a student majoring in Animal or Poultry Husbandry for outstanding merit in the work of the third year in the Faculty of Agriculture.

The Entomological Society of Alberta Prize—An annual prize of $50.00 is offered by this society to the student obtaining the highest standing in one or more senior courses in the Department of Entomology. The award is conditional on a satisfactory general record.

The Western Canadian Society for Horticulture Prize—The Western Canadian Society for Horticulture has provided for a prize of $25.00 to be awarded annually to the third or fourth-year student who is specializing in horticulture, for outstanding merit in horticulture courses, provided the student's record is considered satisfactory by the Faculty Council.

The J. E. Olsen Prize—See details under the Faculty of Arts and Science, Department of Botany.

The Charles James Thompson Memorial Prize in English 210—See details under Faculty of Arts and Science, Department of English.

THE FACULTY OF COMMERCE

The T. Eaton Company's Gold Medal in Commerce is awarded annually to the graduating student who receives the highest standing in the courses of the second and third years, providing the student's record is considered satisfactory by the Faculty of Commerce.

The Hudson's Bay Company Gold Medal in Commerce is awarded annually to a graduating student in the Bachelor of Commerce course for outstanding merit in the prescribed courses in Economics, namely Economics 200, 320 and 340, provided that the student's record is considered satisfactory to the Faculty of Commerce.

The Winspear, Hamilton, Anderson and Company Scholarship to the value of $500.00 is offered annually to a student proceeding to the degree of B.Com. for outstanding merit in the courses of the first year, provided the standing is satisfactory to the Faculty of Commerce. The scholarship will be paid in two equal instalments; first, on registration in the second year, and second, on registration in the third year. Payment of the second instalment is subject to the student obtaining an average of at least 75% in the courses of the second year.

The Hudson's Bay Company Scholarship in Commerce, valued at $300.00 is offered to a student proceeding to the degree of Bachelor of Commerce for outstanding merit in the courses of the first and second years, provided that the standing is satisfactory to the Faculty of Commerce. The scholarship is payable upon registration for the third year of the course.

The W. T. Henry Scholarship valued at $250.00 is offered by the Edmonton Furniture Men's Association to the student who obtains the highest average standing in the third year program of the course leading to the degree of Bachelor of Commerce with Honors in Business Administration. The scholarship will not be paid until the winner has registered for the fourth year in Commerce at the University of Alberta.

The Frederick Charles Manning Memorial Scholarship of $250.00 is offered in memory of their father by Mrs. F. Armour (Manning) Ford, Alberni, B.C., Mr. F. C. Manning, Calgary, Alberta, and Mr. A. H. Manning of Port Alberni, B.C. The scholarship will be awarded for outstanding merit in the courses of the first or second year of Commerce and for participation in extra-curricular activities.

The Renkenberger Scholarship—See details on page 511.

The Scholarship of the Western Daily Newspapers Advertising Managers' Association of the value of $100.00 is offered to the student entering the final year in Commerce with the best preparation for specialization in Advertising. For the present, outstanding merit in Business 300 will be the basis of award.

The Hudson's Bay Company Prize of the value of $50 is awarded to a student for outstanding merit in the work of the second year in Commerce.

The Institute of Chartered Accountants of Alberta Prizes are awarded annually as follows:

(1) a prize of $50.00 to the student in the Faculty of Commerce who takes the highest average standing in Accounting 200 and Accounting 300, provided the student's record is satisfactory to the Faculty of Commerce;

(2) a prize of $100.00 to a student of outstanding merit majoring in Accounting in the final year of Commerce.

The Clarkson, Gordon & Co. Prize of the value of $50.00 is awarded to the student in the second year of Commerce who obtains the highest standing in Accounting 300, provided that the student's record is otherwise satisfactory to the Faculty of Commerce.

The T. Eaton Co., Ltd., Edmonton, offers two book prizes as follows:

A prize of books to the student securing the highest standing in the courses of the first year.

A prize of books to the student securing the highest standing in the courses of the second year.

In both instances the award will be subject to the student's record being considered satisfactory by the Faculty of Commerce.

The Friends of the University Bursary in Commerce—The Friends of the University have provided a bursary of $100.00, open to students who have completed the first or second year of the B.Com. degree course in the Faculty of Commerce. The award will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards before June 15.

The Hudson's Bay Company Merchandising Awards—See under "Other Forms of Financial Assistance."

The Riddell, Stead, Graham & Hutchison Award—This award will be given to a student completing the second year of the course leading to the degree of Bachelor of Commerce, who is proceeding to the third year, and who intends on graduation to enter articles with a practising firm of chartered accountants. The value of the award will be the tuition fees in the final year of the Faculty of Commerce. In addition, the winner will be offered summer employment with Riddell, Stead, Graham & Hutchison. The award will be made to a student whose personality, ability, academic record and other characteristics are, in the opinion of the Faculty of Commerce, those needed by a chartered accountant.

Application should be made to the Dean of the Faculty of Commerce before March 31.

THE FACULTY OF DENTISTRY

The Alberta Dental Association Gold Medal is awarded to a student for outstanding merit in the work of the fourth year, provided that the year average is not less than 75%.

The International College of Dentists (Canadian Section) Scholarship in Dentistry, valued at $100.00, is offered annually to a student completing the third year of Dentistry. The basis of award will be outstanding merit in the third year, general character and participation in extracurricular activities.

The Alberta Dental Association Scholarships are three in number of the value of $200.00 each, and will be awarded as follows:

1. One to the student taking the highest average mark in all courses of the first year.
2. One to the student taking the highest average mark in all courses of the second year.
3. One to the student taking the highest average mark in all courses of the the third year.

The Alberta Dental Association Prize of the value of $50.00 is awarded to a student of outstanding merit in the work of the second year, provided that the year average is not less than 75%.

The Calgary and District Dental Society Scholarship of the value of $100.00 is offered annually to a student entering third year, who shows outstanding merit in the basic science courses of the first two years of Dentistry, provided that his overall average in Anatomy, Bacteriology, Biochemistry, Physiology and Pathology is 75% or higher.

The Edmonton Dental Society Prizes of the value of $100.00 each are awarded to a student of outstanding merit in (a) the work of the first year, (b) the work of the third year, provided that the year average is not less than 75%.

In making the above awards, consideration will also be given to character and interest in student activities.

The formal presentation of the prizes will be made at the October meeting of the Edmonton Dental Society.

The Arthur D. Cumming Scholarship of the value of $200.00 is offered annually to a student of outstanding merit entering the second year of Dentistry.

The Alberta Dental Association Scholarship of the value of $300.00 is offered annually to a student of outstanding merit in the pre-professional course at the University of Alberta, provided that the student enters first year Dentistry and that his over-all average is 75% or higher.

The Dean's Scholarship in Dentistry, of the value of $300.00, is offered by an anonymous donor. It is open to fourth year students in dentistry. The award will be made on the basis of financial need and scholarship.

Application should reach the Administrator of Student Awards by October 7.

The College of Dental Surgeons of Saskatchewan Scholarship of the value of $150.00 is offered annually to a student of outstanding merit entering the fourth year of Dentistry.

The Fred Stapells Scholarship in Dentistry, of the value of $150.00, is offered annually to a first-year student of outstanding merit in the pre-professional work at the University of Alberta, provided that the over-all average mark for the student is 75% or higher.

The Elizabeth and Wesley Haynes Prize of $50.00 is offered to students of outstanding merit in the pre-professional studies at the University of Alberta, who have registered in the course in Dentistry.

The Harry Ernest Bulyea Scholarship of the value of $100.00 is awarded by the University of Alberta Dental Alumni Association to the third-year student with the highest average mark in all courses in operative and restorative dentistry.

The Harry Alexander Gilchrist Scholarship of the value of $100.00 is awarded by the University of Alberta Dental Alumni Association to the third-year student with the highest average mark in all courses in prosthetic dentistry.

The Dental Prize of $50.00 is offered by Dr. J. W. Clay to a special student in the Faculty of Dentistry, for general excellence in the first year of study. A candidate for this award must be a recent immigrant to Canada, must have graduated from an overseas dental school and must have been in attendance in the Faculty of Dentistry for at least six months.

The Friends of the University Bursaries in Dentistry—The Friends of the University have provided two bursaries of $100.00 each, open to students who have completed the first year and are entering the second year of the D.D.S. course in the Faculty of Dentistry. The awards will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Dental Faculty Class of 1950 Bursary is offered by members of the Dental Class of 1950 to a student of outstanding merit who has completed the second year and is entering the third year in the Faculty of Dentistry at the University of Alberta. The award will be made by the Trustees of the Award Fund on the bases of academic merit and financial need.

The Award of the American Academy of Dental Medicine, consisting of a five year subscription to the "Journal of Dental Medicine" is made to the graduating student who has displayed the greatest interest in dental medicine during his course.

The Postgraduate Scholarship Fund in Dentistry has been established through the generosity of members of the dental profession. The purpose of this fund is to assist dental graduates in pursuing postgraduate studies at other institutions in preparation for teaching. Younger persons will be given preference.

Applications should be made to the Dean. All applications must be submitted to the Council of the Faculty of Dentistry for approval.

THE FACULTY OF EDUCATION

The Clarence Sansom Memorial Gold Medal in Education is offered annually by the Alberta Teachers' Association to the student who has shown highest general proficiency in the final year of the Bachelor of Education program.

The Board of Governors of the University Scholarship of the value of $100.00 is awarded on the basis of the work of the first year in Education, provided that an average of not less than 75% be obtained in the work of the year.

The University Scholarships in Education to the value of $100.00 each are offered to students registered in a full program, who have completed the first year in the Elementary Route to the degree in Education. The awards will be made to the three students with the highest average standing, provided that this average does not fall below 75%.

Alberta Teachers' Association Scholarships to Students in Education—Four scholarships, in honor of Honorary Life Members of the Association in the amount of $500 each, are offered annually by The Alberta Teacher's Association to intramural students proceeding from the third to the fourth year of the

Bachelor of Education program. The applicants for these scholarships must be bona fide residents of Alberta. Each must have a minimum average of 70 per cent and must give evidence of intention to follow teaching as a career. The scholarships are payable upon registration for intramural study in the fourth year of the Bachelor of Education program, Faculty of Education, University of Alberta, provided that study is continued at the next regular winter session of the University of Alberta following the award. Application should be made to the General Secretary, Alberta Teacher's Association, Barnett House, Edmonotn, not later than May 15.

Alberta Teachers' Association Scholarships to Teachers in the Field—Four scholarships, in honor of Honorary Life Members of the Association, each in the amount of $500, are offered annually by The Alberta Teachers' Association to teachers in the field who, having completed three years of training and holding a permanent Alberta teaching certificate, are proceeding to the fourth year in the Bachelor of Education program. Applicants for these scholarships must be bona fide residents of Alberta, must have a minimum average of 70 per cent, and must give evidence of intention to follow teaching as a career. The scholarships are payable upon registration for intramural study in the fourth year of the Bachelor of Education program, Faculty of Education, University of Alberta, provided study commences at a regular winter session within one year after the award is made. Application should be made to the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton, not later than May 15.

The Fuller Brush Company Scholarships in Art—Two scholarships of $200.00 each are awarded to students of outstanding merit, who are entering either the second or third year of the Art pattern in the Faculty of Arts and Science, or the third or fourth year of the Faculty of Education, majoring in Art, provided that such students are registered in a full year's program.

The Lerner Scholarship in Drama—A scholarship of $100.00 is awarded to a student of outstanding merit enrolled in Drama 350 (Advanced Acting). See under Faculty of Arts and Science, Department of Fine Arts.

The Renkenberger Scholarship—See details on page 511.

The Edmonton Jewish Community Council Scholarship, of the value of $100.00, is offered annually to the student of outstanding merit in the second year of the general B.Ed. with options in Household Economics. If no suitable candidate is found in this course, the scholarship will be awarded to the student of outstanding merit in the second year of any general B.Ed. program.

The P.E.O. Southern Alberta Scholarship in Education, of $100.00, tenable at the University of Alberta, is open to the woman student at the University of Alberta in Calgary who achieves the best record in the first or second year of the secondary route of the Bachelor of Education program. To be eligible a student must have an average of at least 70% in the year's work and a generally satisfactory performance.

The Calgary Section of the Council of Jewish Women offers annually a scholarship of $100 to the man or woman student who makes the highest standing in the first year of the Faculty of Education in Calgary in either the

Elementary or Secondary Route program, and who will proceed to a second year in the next University session, provided that an average of not less than 75%. be obtained on the work of the year. In the event that a suitable candidate is not found in the above area, the award may be given to a student of outstanding merit in the B.A. program of the Faculty of Arts and Science in Calgary.

The Friends of the University Bursaries in Education—The Friends of the University have provided two bursaries of $100.00 each for students who have completed the first year and are entering the second year of the Faculty of Education. The awards will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The First-Year Scholarship of the Education Society of Edmonton—The Education Society of Edmonton offers annually a scholarship of $100.00 to the student completing the first year of a course of studies leading to the Bachelor of Education degree who, in the opinion of the Faculty of Education, gives evidence of greatest academic and professional promise. In making this award the faculty will consider not only scholarship standing but also other factors indicative of professional capacity which it deems significant. The payment of this scholarship will be contingent upon entrance into the second year of the course for the B.Ed. degree.

The Olive M. Fisher Prize of $50.00 is offered by Dr. Olive M. Fisher to a woman student at the University of Alberta in Calgary for outstanding merit in practice teaching in the second year of the B.Ed. program, Elementary Route, provided that her course of studies has not been interrupted by a year or more of teaching in schools.

The Edmonton Home Economics Association Prize of the value of $25.00 in books is awarded annually to the graduating student in the Faculty of Education who obtains the highest average in any two of the following courses in Household Economics: Household Economics 450, 350 and 460, provided that the student's record is otherwise satisfactory to the Faculty Council.

The Education Book Prize to the value of $15.00 is offered by the Education Undergraduate Society. This prize will be awarded to the student who has shown the greatest general proficiency and professional promise in the third year of the Faculty of Education.

The J. E. Olsen Prize—See under Faculty of Arts and Science, Department of Botany.

PROVINCIAL ASSISTANCE FOR TEACHER EDUCATION

Junior E, Standard E, and Standard S programs.

Students in the Junior E program and in the first and second years of the Standard E and Standard S programs may apply for a tuition grant to cover fees (exclusive of Student Union fees).

Students in receipt of such grants shall undertake to render one year of

teaching service in Alberta for each grant received. This service shall be made immediately on receipt of a teaching certificate unless the student proceeds to further training. Default of such undertaking shall make the grant or grants repayable to the Province.

Applications should be made to the Co-ordinator of Teacher Education, Department of Education, Administration Building, Edmonton.

Third and Fourth years of a Bachelor of Education Program.

A maximum of fifty tuition grants will be awarded in each of the third and fourth years of the Bachelor of Education program. Recipients of tuition grants shall undertake to render one year of teaching service in Alberta in public or separate schools, for each grant received. This service shall be rendered immediately following the completion of the fourth year, or of the third year if the student does not enrol for the fourth year immediately following the completion of the third year. In the event of failure to render such teaching service the grant shall become a debt payable to the Province of Alberta.

Application for these grants should be made to, Co-ordintor of Teacher Education, Department of Education, Administration Building, Edmonton.

Tuition Grants for Graduates of other Faculties or other Universities

A maximum of 50 tuition grants will be granted by the Government of Alberta to graduates of the University of Alberta or of other Universities. Candidates must elect a program of teacher education in the Faculty of Education at the University of Alberta, leading to certification to teach at the senior high school level, and must undertake to teach at the high school level in the public or separate school system of Alberta for one year following the completion of a year of training in the Faculty of Education or to refund the grant.

Application forms are available at the office of the Co-ordinator of Teacher Education, Administration Building, Edmonton.

Applications should be attached to the University Registration form and sent to the Dean, Faculty of Education, University of Alberta, Edmonton.

Summer Session Grants for Certificated Teachers

A maximum of 250 Summer School Grants, each of $100, will be payable to applicants who shall be teachers, not in possession of a university degree, who hold at least a Standard S teaching certificate based on a minimum of two years of professional training, or who can, in one summer session of work, qualify for a Standard S certificate. Each applicant must be recommended for assistance by a superintendent or a high school inspector. Each applicant must be approved by the Dean of the Faculty of Education as to academic standing.

Except in special circumstances, the studnet shall normally enroll in two summer session courses, at least one of which shall be an Arts and Science option.

Each student shall undertake to teach in Alberta at Senior High School level for one year immediately following completion of the summer session, or refund the grant to the Province.

Applications should be attached to the University Registration form and sent to the Dean, Faculty of Education, University of Alberta, Edmonton.

THE ALBERTA TEACHERS' ASSOCIATION LOANS

The Alberta Teachers' Association has established a fund to provide loans to teachers who hold a permanent Alberta Certificate and who are in need of financial assistance to continue their preparation as teachers through intramural study. Applications will normally be considered during the months of May and September. Applications to be dealt with in May must be received by May 15. Applications to be dealt with in September must be received by August 31. Special applications may be considered during the University year.

If the loan fund is inadequate to meet all demands made upon it, priority will be given to applications in May. Inquiries and applications should be made to the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton.

LOCAL SCHOOL BOARD ASSISTANCE

Some local School Boards provide grants or loans to students in teacher education programs. Students should inquire of their own principal or local School Board office.

THE FACULTY OF ENGINEERING

Henry Birks and Sons, Limited, Edmonton, offer a gold medal annually, to be awarded to a graduating student in the Faculty of Engineering The basis of the award is primarily scholarship as determined from standing obtained in the two senior years with an average of not less than 75%. Consideration will be given as well to qualities of leadership and character.

The Association of Professional Engineers of Alberta Gold Medals are offered to one graduating student in each of the departments of chemical, civil, electrical, engineering physics, mechanical, metallurgical, mining and petroleum engineering on the basis of individual talent, application and diligent study. For the purposes of this award the academic record of the third and fourth years is combined and a general average of at least 75% must be attained. The right is reserved to withhold the awarding of one or all of these medals if, in the opinion of the Faculty of Engineering, candidates do not show sufficient merit.

The Gas Company Undergraduate Scholarships of $600.00 each are available for award annually to the two students in the Faculty of Engineering who attain the highest academic standing in the prescribed first and second year courses. The scholarships are tenable only at this university and will be paid to the holders in their third and fourth years, $300.00 each year. The right is reserved to withhold the awarding of one or both scholarships if, in the opinion of the Faculty of Engineering, candidates do not show sufficient merit; also to withdraw one or both scholarships during the fourth year of any holder if third-year attainment has been unsatisfactory.

R. Angus (Alberta) Limited Scholarship in Highway Engineering of $500.00 to be awarded annually to a student of outstanding merit entering fourth year Civil Engineering in the Highway Engineering Program. To qualify, the student must have taken a complete third year program in Civil Engineering at the University of Alberta and have attained an average of at least 75%.

Apply to Administrator of Student Awards by June 15.

The John Alexander McDougall Memorial Scholarship in Civil Engineering of the value of $500 is offered annually to a student of outstanding merit entering the fourth year of Civil Engineering. The award will be based on the work of the third year.

The Dow Chemical Scholarship in Chemical Engineering, consisting of a scholarship of $500 to the student selected and a grant of $250 to the Department of Chemical and Petroleum Engineering, is offered annually by Dow Chemical of Canada Limited to a student of outstanding merit on the basis of his academic record in the third year of Chemical Engineering and his interest in the Chemical Engineering Club of the University of Alberta and in student affairs generally. The Scholarship is tenable at the University of Alberta in the fourth year of Chemical Engineering. Application for the scholarship is not necessary.

The Jessie E. Paull Memorial Prize of the value of $50.00 is awarded annually to the student obtaining the highest standing in C.E. 410 (Highway Engineering) in the fourth year of civil engineering, provided the student obtains an average of a least 75% in this subject and is registered in a full year's program.

The Mobil Oil of Canada, Ltd. Scholarship in Petroleum Engineering, consisting of a scholarship of $400 to the student selected and a grant of $400 to the department in which the student is registered, is offered to a student entering the fourth year of Petroleum Engineering on the basis of outstanding merit in the third year, and evidence of initiative and good character.

Applications should reach the Administrator of Student Awards by June 15.

The California Standard Company Scholarship in Petroleum or Chemical Engineering valued at $400.00, is offered annually by the California Standard Company to a student of outstanding merit in petroleum or chemical engineering who is interested in oil exploration or production. The scholarship is tenable in the final year of the student's course.

Applications should reach the Administrator of Student Awards by June 15.

The California Standard Company Geological Scholarship, valued at $400.00, is offered annually by the California Standard Company to a student of outstanding merit in geology or geological engineering who is interested in oil exploration or production. The scholarship is tenable in the final year of the student's course.

Applications should reach the Administrator of Student Awards by June 15.

The California Standard Company Geophysical Scholarship, valued at $400.00, is offered annually by the California Standard Company to a student of outstanding merit who is entering the third year of honors Physics and Geology or Engineering Physics (Geophysics option), and who is interested in oil exploration or production.

Applications should reach the Administrator of Student Awards by June 15.

The Sunwapta Broadcasting Company Scholarship of $200.00 for students entering fourth year Engineering Physics or Electrical Engineering interested in the field of communications, as related to the Broadcasting and Television industry.

Apply to Administrator of Student Awards before June 15. (See further details under Faculty of Arts and Science.)

The Canada Cement Company Scholarships—Two scholarships, each of the value of $500.00 are offered annually to students of outstanding merit, one entering third year Civil Engineering and one entering third year Mechanical Engineering, at the University of Alberta, to be based on the work of the second year. To qualify a student must have completed a second year program of normal weight at the University of Alberta and have attained an average of at least 75.%.

In the event that no student qualifies for one of the above, the award would be made available in the other department as a second award for that year.

The Johnston Testers Limited Scholarship of the value of $500.00 is offered to a student of outstanding merit entering the third year of Petroleum Engineering. The award will be based on the work of the second year of Engineering at the University of Alberta.

The James A. Lewis Engineering Scholarship in Petroleum Engineering, valued at $500.00 is offered by James A. Lewis Engineering, Ltd. to a student entering the third year of Petroleum Engineering at the University of Alberta. Selection will be based on academic record in the second year of Engineering and on financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Northern Electric Undergraduate Scholarship which provides an amount not exceeding $500 to cover tuition and general fees and the cost of books for one year, is awarded annually to a student of outstanding merit who is proceeding into the second, third or fourth year of Electrical Engineering, Engineering Physics or Honors Physics. The applicant must be a Canadian citizen or a landed immigrant and must normally have secured an average of at least 75% in the work of the preceding university year. Students who have held the scholarship previously are free to apply for renewal of the award.

Applications should reach the Administrator of Student Awards by June 15.

Petrofina Group Western Canada Scholarships—See details under Matriculation Awards.

Smalley's Radio Ltd. Bursaries—Two bursaries of $500 each are offered annually by Smalley's Radio Ltd. of Calgary to students who are entering the second or third year of Honors Physics, or the third year of Engineering Physics at the University of Alberta. The award will be made on the basis of scholastic standing and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The American Society for Metals Foundation Scholarship in Metallurgy, valued at $500, will be given annually by the Foundation for Education and Research of the Society to a student who has completed his first or second year in Metallurgical Engineering. The award will be made on the recommendation of the Department of Mining and Metallurgy, based on the student's academic record and general ability, and will be paid after his registration in the following year of the Metallurgical Engineering course.

The Canadian Legion Scholarship in Physics or Electrical Engineering of $400 is offered annually in the field of Physics or Electrical Engineering.

The terms of award are otherwise the same as for the Canadian Legion Scholarship—see page 499.

Applications should reach the Administrator of Student Awards by June 15.

The Sam J. Gorman Memorial Bursary in Engineering of the value of $300.00 is offered by his executors to a student who has completed the second year of any branch of Engineering at the University of Alberta. The award will be based upon high scholastic standing in the work of the year just completed and upon evidence of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The R. C. E. Memorial Scholarships—The Royal Canadian Engineer Memorial Trust offers annually a scholarship to a student who has completed his third year in Engineering. Applicants must be members in good standing of the Officers' Training Corps and have had at least one summer's training with such unit. Award will be made on the basis of academic standing and qualities of leadership manifested in the activities of the Officers' Training Corps and in student affairs generally. Applications should reach the Administrator of tSudent Awards by March 30.

The British American Paint Company Scholarship in Engineering of $500 is awarded annually to a student of outstanding merit entering the second year of the Faculty of Engineering. The award will be based on the work of the first year.

The H. R. Webb Memorial Scholarship of the value of $200.00 is offered annually by the Association of Professional Engineers of Alberta in memory of Professor Harry Randall Webb, formerly Registrar of the Association, to a student of outstanding merit entering the second year of the Faculty of Engineering. The award will be based on the work of the first year.

The Board of Governors of the University Scholarship of the value of $100.00 is awarded annually to a student of outstanding merit entering the second year of Engineering, provided that an average of not less than 75% has been obtained on the work of the first year.

The A. Cristall Memorial Scholarship of $100.00 is available for award annually to students of outstanding merit in Graphics 150 in first year Engineering. To be considered, the student must have passed all courses of the full first year, and have a general average of not less than 75%.

Engineering Institute of Canada Prize for Third-Year Students in Engineering—The Engineering Institute of Canada offers a prize of $25.00, open for competition to university students in Engineering following all of the prescribed courses in chemical, petroleum, civil, electrical, mining, or mechanical engineering.

To be eligible a student must be a member of, and active in, such a students' engineering organization of the University as the Engineering Students' Society, the Mining and Geological Society, the Chemistry Club, the Students' Branch of the American Institute of Electrical Engineers or the Insitiute of Radio Engineers.

The recommendations for award shall be made, after the final examinations of the year, by a committee to be appointed by the Dean of Engineering at a faculty meeting in the session.

The bases of award shall be: (a) the average mark for the courses assigned to that year, this in no case to be less than 75%, and (b) the value of services rendered to a students' engineering organization of the University.

The Prize in Economic Geology, of the value of $25.00, is offered annually by George E. Cole, Past President, Canadian Institute of Mining and Metallurgy, to the student obtaining the highest standing in Geology 458 or 460, provided that the student obtains an average of at least 75% in the subject and is registered in a full year's program.

The Chemical Institute of Canada Prize in Chemical Engineering of the value of $25.00 in books is awarded annually to the student in Chemical Engineering who obtains the highest standing in the work of the third year, provided that the student's general record is satisfactory to the Faculty Council.

The Northern Alberta Branch of the Canadian Institute of Mining and Metallurgy offers four prizes of $15.00, one prize for the best student paper submitted during the term on each of the following subjects: (a) Coal mining or coal preparation, (b) Metal mining or metallurgy, (c) Geology, and (d) Petroleum. To be eligible a student must be a member of the Mining and Geological Society of the University of Alberta. Recommendations for awards are to be made by each department concerned. The prizes may be withheld if the papers submitted are not considered to be of sufficient merit to justify the awards.

The Oilfield Technical Society Prize—A prize of $100.00 is offered by the Oilfield Technical Society to the student in the fourth year of either Chemical or Petroleum Engineering who, writing on some phases of the petroleum industry, obtains the highest grade for a "Report on Practical Experience" submitted in fulfilment of the requirements of Chemical Engineering 473 (Petroleum Engineering 493).

The Cave and Company Ltd. Scholarship in Chemistry—Refer to details under Faculty of Arts and Science, Department of Chemistry.

THE SCHOOL OF HOUSEHOLD ECONOMICS

The Warren W. and Ida E. Prevey Memorial Gold Medal in Household Economics is offered by Dr. Esther and Miss Ruth Prevey in memory of their parents to the graduating student making the highest standing in the work of the last two years of the course leading to the degree of B.Sc. in Household Economics, provided such student's standing is deemed satisfactory to the School of Household Economics.

The Lorena Barfoot Prize in Household Economics, valued at $50.00 is awarded annually to the student who takes the highest standing in the Household Economics courses of the senior year and who is proceeding to an institutional management interneship approved by the Canadian Dietetic Association, provided that the student passes all courses and that the student's record is satisfactory to the School of Household Economics. The award will be paid after the student has entered the course of her choice.

The Mabel Patrick Scholarship of the value of $100.00 is awarded annually by the Alberta Home Economics Association to the student in Household Economics who takes the highest standing in the work as outlined for the first and second years, provided that the student passes all courses and obtains an average of not less than 75%.

The Florence Hallock Memorial Prize of the value of $50.00 is awarded annually by the Edmonton Home Economics Association to the student in Household Economics who takes the highest standing in the work as outlined for the first year, provided that the student passes all courses and obtains an average of not less than 75% on the work of the year. The prize is payable upon registration for the work of the next year of the course.

The Annie Gertrude Tory Scholarship of the value of $75.00 endowed to her memory by her husband, the late Henry Marshall Tory, first President of the University, is offered annually to the student in Household Economics who takes the highest standing in the work as outlined for the second year and who is entering the final year. The student must pass all courses and obtain an average of not less than 75% on the work of the year.

The Gretta Shaw Simpson Memorial Prize of the value of $25.00 is offered annually by Miss Maimie S. Simpson in memory of her sister, formerly instructor in Bacteriology in this University. It is to be awarded annually to the student in Household Economics who takes the second highest standing in the work as outlined for the second year, provided that the student passes all courses and obtains an average of not less than 75% on the work of the year.

The Edmonton Home Economics Association Prize—See under Faculty of Education, page 528.

The Maria Isabel O'Connor Prize to the value of $15.00 is offered annually in honor of the mother of the late Honorable G. B. O'Connor, Chief Justice of Alberta, to the student in second year Household Economics, who takes the highest standing in Household Economics 304, provided that the student has carried the full work of the second year and has a record satisfactory to the School of Household Economics.

The Phylis Osborne McGachie Bursary in Household Economics of the value of $100.00 is available to a student in the second year of the B.Sc course in Household Economics. The award will be made on the basis of academic record, which must not fall below second class, and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Alberta Wheat Pool Scholarships—See under Matriculation Scholarships, page 497.

The Friends of the University Bursary in Household Economics—The Friends of the University have provided a bursary of $100.00, open to students who have completed the first year and are entering the second year of the B.Sc. degree course in the School of Household Economics. The award will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

THE FACULTY OF LAW

The Horace Harvey Gold Medal, established by the late Chief Justice of Alberta, is offered for the highest standing in the work prescribed for the LL.B. degree, provided that the student obtains an average of not less than 75%.

The George Bligh O'Connor Silver Medal in Law is offered in memory of the late Honorable G. B. O'Connor, Chief Justice of Alberta, for the second highest standing in the work prescribed for the LL.B. degree, provided that the student obtains an average of not less than 75%.

The Board of Governors of the University Scholarship of the value of $100.00 is awarded on the basis of the work of the first year in the Faculty of Law, provided that an average of not less than 75% be obtained in the work of the year.

The President's Scholarships—See under the Faculty of Arts and Science, page 510.

The Edmonton Lodge of B'nai B'rith Prize of $50.00 is offered to such student in the second year of Law as may be selected by the Faculty of Law.

The Raymond James Memorial Prize—A prize of the value of $25.00 is offered annually by Mrs. E. L. FitzSimon, LL.B., 1926, in memory of her brother, to be awarded to the final year student in Law, who has obtained the highest mark for an essay appertaining to equity, the subject to be selected each year by the Dean of the Faculty. The subject of the essay for 1960-61 is "Equity; i.e. Treatment of Agreements for the Benefit of Third Persons". Essays should be in the hands of the Administrator of Student Awards not later than May 1, 1961. Essays should be typewritten. The copy of the essay winning the prize is to become the property of the University. The right to withhold the prize is reserved in the event that no sufficiently meritorious essay is submitted.

The National Trust Prize—A prize of books of the value of $30.00 is offered by the National Trust Company to a student of the graduating class in Law for outstanding merit in the examinations in Equity 1, Equity 2, Real Property 2, Real Property 3, and Wills and Administration. A student is ineligible for this prize if his average on the examinations of the second and third years of his law course is less than 75%.

The Sydney B. Woods Memorial Prize in Constitutional Law—A prize of value of $25.00 has been provided by S. W. Field, Q.C. and L. D. Hyndman, Q.C., former partners of the late Sydney B. Woods, K.C. The prize is awarded annually to a student in the graduating class in Law for outstanding merit in the subject of Constitutional Law. The award is conditional upon the student's reaching a standard which is deemed satisfactory to the Faculty Council.

The Morris and Noami Shocter Memorial Prize in Law of $50.00 is awarded to a student at the end of the third year of Law, who has maintained a satisfactory academic record and who has made a significant contribution to student life in the University.

The Carswell Prizes in the Faculty of Law are offered annually by the Carswell Company, Limited, law publishers, of Toronto. These are to be awarded on the following terms:

(a) Books of the value of $30.00 to a student for outstanding merit in the work of the first year;

(b) Books of the value of $30.00 to a student for outstanding merit in the work of the second year.

(c) Books to the value of $30.00 to a student for outstanding merit in the work of the third year.

The books shall be selected by the student from a list submitted by the Carswell Company, and the selection shall be made within six months of the awarding of the prize.

The Viscount Bennett Trust Fund Scholarship—Under the terms of a deed of gift to the Canadian Bar Association from the late Right Honorable Viscount Bennett, P.C., K.C., LL.D., D.C.L., honorary life president of the Association, a trust fund known as the Viscount Bennett Trust Fund has been established. The annaul income from the fund or the sum of $1,000.00, whichever is the less, will be paid annually as a scholarship for postgraduate study in law at an approved graduate school.

The scholarship is open to final-year and graduate students of approved Canadian law schools, of which the Faculty of Law of the University of Alberta is one.

Applications for this scholarship should reach the Dean of the Faculty of Law before October 15.

THE FACULTY OF MEDICINE

General

The Moshier Memorial Medal is offered by the Volunteer Overseas Medical Officers' Association of Edmonton in memory of the late Lieutenant-Colonel H. H.Moshier, M.B., to a graduating student for outstanding merit in all studies in the Faculty of Medicine, provided that the over-all average mark of the student is 75% or more.

The John W. Scott Honor Award, consisting of a medal and a cash prize of $250.00, is offered by the Medical Alumni Association of the University of Alberta to a student completing the final year of the M.D. program who, over the four years of the course, has shown himself to possess to an outstanding degree those qualities of scholarship, leadership and character which may be expected to lead to a distinguished position in the medical profession. The recipient will be selected by a committee on which faculty, students and alumni will be represented.

The award may be made to more than one student in any one year, and may be withheld in the event that no sufficiently deserving candidate is available.

Research Fellowship of College of Physicians and Surgeons of Alberta—The Council of the College of Physicians and Surgeons of Alberta has established a research fellowship for undegraduates in the Faculty of Medicine under the following conditions:

1. The amount of the fellowship shall be $1,200, plus general and instruction fees for the next year in medicine, provided the holder returns to this school.

2. It shall be granted at the completion of the second year in Medicine.
3. This fellowship shall be tenable for one year, but may be renewed for a further period.
4. The research shall be carried out in one of the basic sciences.
5. It shall only be granted when in the opinion of the Medical Faculty they have a student who from the standpoint of ability and aptitude is worthy of this scholarship.
6. From time to time the Council shall be advised of the nature of the work being carried out and its progress.

Applications should reach the Administrator of Student Awards before April 15.

The Scholarships of the College of Physicians and Surgeons of the Province of Alberta are six in number, of the value of $200.00 each, and will be awarded as follows:

1. One scholarship shall be awarded to that student of each of the tirst three years of Medicine who attains the highest average mark in his class.
2. One scholarship shall be awarded to that student of each of the first three years of Medicine who attains the second highest average mark in his class.

Each of these awards is contingent upon the student's proceeding with his University course during the year following the award.

The Dr. Allan Coates Rankin Award, of the value of $100.00, will be awarded annually to the most deserving and outstanding student completing any year of the Faculty of Medicine. The selection will be made by the Faculty on a basis of academic standing in that year and of financial need.

The Alberta Tuberculosis Association Prize of $100.00 is offered annually to a third or fourth year medical student for the most satisfactory essay, submitted in duplicate, on some phase of thoracic disease. The prize also includes a one-year subscription to the American Review of Tuberculosis. Essays should be submitted to the Administrator of Student Awards before March 15.

The Friends of the University Bursary in Medicine—The Friends of the University have provided a bursary of $100.00, open to students who have completed one or more years of the M.D. degree course in the faculty of Medicine. The award will be made on the basis of academic proficiency and financial need.

Applications should reach the Administrator of Student Awards by June 15.

The Kenneth William Moodie Scholarship—As a memorial to her nephew, Flying Officer Kenneth William Moodie, a graduate in science of the University of Alberta who lost his life in May, 1942 while on operations, the late Miss Marion E. Moodie made provision in her will for an annual scholarship of $150.00 to a student of outstanding merit entering the first year of the Faculty of Medicine or the third year of the B.Sc. program in the Faculty of Arts and Science. The basis of award will be academic attainment on the previous year's standing at the University of Alberta, financial need and evidence of satisfactory personal qualities.

Applications should reach the Administrator of Student Awards by June 15.

Bacteriology

The Allan Coates Rankin Prize in Bacteriology is given by the Rankin Medical Journal Reporting Club to the medical student who obtains the highest mark in Bacteriology 421, provided that he has obtained at least a 75% mark in this course and that he is taking, and has passed, all of the subjects of that year.

Medicine

The E. L. Pope Memorial Gold Medal in Medicine is offered annually by the Edmonton Academy of Medicine to a graduating student for outstanding merit in Medicine, providing that the overall average mark in courses in Medicine is 75% or more.

The Prizes of the Associated Hospitals of Alberta in Medicine and Surgery of the value of $50 each are offered by the Associated Hospitals of Alberta to two third year students of outstanding merit in the work of Medicine and Surgery respectively in second and third years.

The Prize in the History of Medicine, of the value of $10.00 in books, is offered by Dr. H. C. Jamieson for an essay on some phase of the earlier development of anatomy or physiology, which should be submitted by March 15. This prize is open to students enrolled in the third year of Medicine.

Obstetrics and Gynaecology

The Conn Memorial Medal is offered annually through the generosity of Mr. G. H. Wood to a graduating student for outstanding merit in Obstetrics and Gynaecology, providing that the over-all average mark of the student in the courses in these subjects is 75% or more.

The Harrison Memorial Scholarship—A scholarship of $100.00 is offered by the Harrison Medical Reporting Club in memory of Dr. John Darley Harrison, formerly Associate Professor of Gynaecology, to the third-year student receiving the highest average mark in Obstetrics and Gynaecology in the second and third years.

Physiology and Pharmocology

The Ardrey W. Downs Prize in Physiology is given by friends of the department to the medical student who obtains the highest mark in the course in physiology in the first year provided he has obtained at least a 75% mark and has passed in all subjects. The prize is an instrument useful in medical practice of a value of about $40.00.

The Nathan Browne Eddy Prize in Pharmacology is offered by Hoffmann-La Roche Limited to a student who has successfully completed the second year of Medicine with an average standing of at least 75% and has shown outstanding merit in the course in Pharmacology. The prize is an instrument useful in Medical practice or books to the value of about $40.00.

Psychiatry

The Dr. S. S. Spaner Prize in Psychiatry, of the value of $50.00, will be awarded annually to a student of outstanding merit in Psychiatry who is completing the final year, provided the student's record is otherwise satisfactory.

Surgery

The Mewburn Memorial Gold Medal in Surgery is offered annually by the Medical Undergraduate Society of the University of Alberta to a graduating student for outstanding merit in surgery, providing that the over-all average mark of the student in courses in Surgery is 75% or more.

The Prizes of the Associated Hospitals of Alberta in Medicine and Surgery —see under Medicine above.

The Surgical Research Prize of $50.00 will be awarded to a third or fourth year student in the Faculty of Medicine for the best manuscripts submitted on an original Surgical Research topic. Suggested general divisions for the topics are Pure Experimental Surgical Research or Clinical Surgical Research. Although importance will be attached to an original approach to an unsolved problem, other topics will be considered. Manuscripts are to be neatly typewritten, double spaced and are not to exceed twenty-five full pages. Figures, charts and an adequate bibilography will be expected. For details regarding the manuscript applicants may contact the members of the Department of Surgery. Manuscripts must be submitted to the Dean of Medicine by March 31 of each year.

The Doctor D. S. Macnab Bursary—See Graduate Awards.

The Dorothy Jean Usher Memorial Scholarship for Medical Research—see Graduate Awards.

THE SCHOOL OF NURSING

The President's Gold Medal in Nursing and the Prize of the Chairman of the University Hospital Board are awarded to a graduating student for outstanding merit in the theory and practice of nursing.

The Board of Governors of the University awards book prizes as follows:

(a) For outstanding merit in nursing during the senior year.

(b) For outstanding merit in the theory of nursing during the senior year.

(c) For outstanding merit in the practice of nursing during the senior year.

The Edmonton Home Economics Association Prize is awarded to a graduating student for outstanding merit in the theory and practice of nutriton.

The Medical Staff of the University Hospital awards prizes in the graduating year as follows:

(a) Strathcona Prize in Medicine

(b) Strathcona Prize in Obstetrics and Gynaecology

(c) Strathcona Prize in Psychiatry

(d) Strathcona Prize in Surgery

The Operating Room Nursing Prize is awarded to a graduating student for outstanding merit in operating-room technique.

The Helen Smith Peters Memorial Prize is awarded to a graduating student for outstanding merit in the theory and practice of paediatric nursng.

The Dr. A. C. McGugan Prize is awarded to the graduating student who, in the opinion of the student body, has contributed most to the welfare of her fellow students.

The Prize for bedside nursing is awarded by the Nursing Staff to the graduating student who has the best record for kindness and proficiency in bedside nursing.

The University of Alberta Hospital School of Nursing Alumnae Association Prize is awarded to a student for outstanding merit in the theory and practice of nursing in the intermediate year.

The Meta M. Hodge Memorial Prize is awarded to a student for outstanding merit in the practice of nursing in the intermediate year.

The Canadian Nurse Magazine Prize of a one-year subscription to the Canadian Nurse is awarded by the Editorial Board of the Canadian Nurse to a student for outstanding merit in the theory and practice of nursing in the junior year.

The Women's Auxiliary of the University Hospital Prize is awarded to a student for outstanding merit in the theory and practice of nursing in the preclinical term.

The Friends of the University Bursary in Nursing—The Friends of the University have provided a bursary of $100.00, open to students entering the final year of the B.Sc. degree course in the University of Alberta School of Nursing.

The award will be made on the basis of academic proficiency and of financial need.

Applications should reach the Administrator of Student Awards by June 15.

THE FACULTY OF PHARMACY

The Pharmaceutical Association Medal is offered by the Alberta Pharmaceutical Association under the following terms:

> A gold medal for oustanding merit in all subjects of the final year, provided that the mark in any subject does not fall below 60% and that the average obtained in all subjects is not less than 75%.

Pharmaceutical Association Awards are offered by the Alberta Pharmaceutical Association:

1. A scholarship of $100.00 for outstanding merit in all subjects of the first year, provided that the mark obtained in any subject does not fall below 60%.
2. A scholarship of $100.00 for outstanding merit in all subjects of the second year, provided that the mark obtained in any subject does not fall below 60%.
3. A book prize consisting of a five-year subscription to The Practical Pharmacy Edition of the Journal of the American Pharmaceutical Association for outstanding merit in the dispensing course in the second year.
4. A prize consisting of registration with the Alberta Pharmaceutical Association, for the student preparing the best thesis in the Pharmacy 433 (33) laboratory course, provided the record of the student is otherwise acceptable to the Faculty.

The M. J. Warner Scholarship of the value of $100.00 is offered annually by the Alberta Pharmaceutical Association in memory of the late M. J. Warner for outstanding merit in the pharmacy course of the first and second years, provided that the mark in any pharmacy subjects does not fall below 65%, that the average obtained in all subjects is not less than 75% and that the student's record is otherwise satisfactory to the Faculty of Pharmacy.

The Shipley Scholarship of the value of $250.00 is offered by Shipley Photo Service Limited to a student of outstanding merit completing the second year course in dispensing pharmacy.

The Drug Travellers of Alberta Bursary of the value of $300.00 is offered jointly by the Alberta Range Riders, Calgary, and the Northern Ambassadors, Edmonton (Alberta drug travelling fraternities), to a student of outstanding merit who has completed at least one academic year in the Faculty of Pharmacy. The basis of this award is scholarship, leadership, financial need and aptitude in the field of Pharmacy.

Applications should reach the Administrator of Student Awards by May 15.

The Calgary Ladies Pharmaceutical Prize is offered annually to a woman student of outstanding merit in the pharmacy courses of the first year, provided that her combined average in these courses is not less than 75%, and that her record in the other courses is satisfactory to the Faculty of Pharmacy. If no qualified woman student is available the award may be made to a man. The amount of the award will be determined each year but it is expected to be not less than $50.00.

The Canadian Foundation for the Advancement of Pharmacy Scholarships, valued at $100.00 are offered to undergraduates. The number of such scholarships will be determined from year to year. One award will be available to a student completing the first year of the course, and one to a student completing the second year.

The minimum requirements are a general average of 75% for the previous term's work, provided the standing in the practical work in Pharmacy does not fall below 75%. Financial need will be considered in making the award.

The Charles E. Frosst Scholarship of the value of $250.00 is offered annually by Charles E. Frosst and Company of Montreal to a student of outstanding merit entering the final year of the Faculty of Pharmacy.

The Charles Cummer Memorial Prize of the value of $100.00 is offered to a student of outstanding merit entering the second or third year of the pharmacy course. Financial need will be considered in making the award.

The Burroughs Wellcome Bursary of the value of $250.00 is offered by Burroughs Wellcome and Company (Canada) Limited to a student entering the second or third year of the pharmacy course who has demonstrated outstanding ability in the field of pharmacy. Financial need will be considered in making the award.

The Merck Prizes are two prizes of books offered by Merck & Co. Ltd.,

Montreal. One prize is offered to the first year student in Pharmacy who attains th highest standing in Chemistry 230, and one to the first year student in Pharmacy who attains the highest standing in Chemistry 250.

The Canadian Pharmaceutical Association Prize consisting of a copy of the Canadian Formulary and a copy of each of the active volumes of the New Products Index is offered to a student of outstanding merit in the Pharmacy 432 course.

THE SCHOOL OF PHYSICAL EDUCATION

The Alumni Gold Medal in Physical Education is offered by the Alumni Association of the University of Alberta to the outstanding graduating student in Physical Education, provided the student has been registered in a full year's program and has obtained an average of at least 75% in the final year.

The Edmonton Women's Branch of the Canadian Association for Health, Physical Education and Recreation offers a prize of the value of $50.00 to be used for the purchase of text books necessary for second year Physical Education. It is awarded to a woman of outstanding merit registered in the first year Bachelor of Physical Education program.

The Edmonton Branch of the Canadian Association for Health, Physical Education, and Recreation Bursaries of $100 each are offered annually, one to a student entering the second year and one to a student entering the third year of the School of Physical Education. These awards will be made on the basis of academic record which must not fall below second class, and of financial need. Consideration will also be paid to the student's contribution in the field of Physical Education or Recreation.

Applications should reach the Administrator of Student Awards by June 15.

Recreation Scholarships—see under Province of Alberta Assistance.

THE SCHOOL OF PHYSICAL THERAPY AND OCCUPATIONAL THERAPY

The Saskatchewan Physical Therapists Association Prize—An annual prize of $50.00 is offered by the Saskatchewan Physical Therapists Association to the student graduating in Physical Therapy with the highest general proficiency standing in all years.

The Physiotherapy Book Prize is offered by the Canadian Physiotherapy Association to the student obtaining the highest standing in the final year of the diploma course in Physical Therapy at the University of Alberta, providing that his or her record is otherwise satisfactory to the Council of the School.

The Canadian Foundation for Poliomyelitis Bursaries are offered to students in the diploma course in Physical Therapy and Occupational Therapy by the Alberta Command, Canadian Legion, B.E.S.L. chapter. Six bursaries, each valued at $350.00, will be avaliable, *three for students entering the course from Grade XII, and three may be awarded to students entering the second year.* The joint bases of award will be scholastic standing (in the required matriculation subjects of Grade XII or equivalent standing as accepted by the University of Alberta, or the first year of the course) and financial need.

Applications should reach the Administrator of Student Awards by August 1.

GRADUATE STUDIES AWARDS

THE FACULTY OF GRADUATE STUDIES

The following Scholarships and Fellowships are awarded primarily on a basis of academic standing. In general, awards are made only to applicants whose previous academic standing is either First Class or high Second Class.

Unless otherwise stated awards are for one year only, but application for renewal will be considered.

In order that awards may be equitably distributed, no student may hold more than one major scholarship award in a given year, that is, an award equal to or exceeding $1,200.00 in value. No award will be given to any student who is not a full-time student. (A full-time student may carry a teaching load of six hours per week, but holders of major awards may not accept a teaching or other assignment involving more than a total of the equivalent of four hours a week during the academic session.)

The following awards are open in two or more Fields of Study:

University of Alberta Graduate Fellowship—This is the senior fellowship within the Faculty and is valued at $3,600 on a twelve-month basis. It is open to a student who has completed at least one year of graduate study and registers for a full-time program leading to either a Ph.D. and Ed.D. degree. An award winner is expected to carry out a full-time research program during the summer months. Tenure may begin at any time from May 1 to October 1.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Graduate Fellowships. Three Fellowships valued at $3,600 each, on a twelve-month basis, are open to students who have completed at least one year of graduate study and register for a full-time program leading to either a Ph.D. or Ed.D. degree. Award winners are expected to carry out a full-time research program during the summer months. Tenure may begin at any time from May 1 to October 1.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Graduate Scholarships. Ten scholarships valued at $2,600 or $2,200 each on a twelve-month basis, are open to students in any year of graduate study. Normally awards of $2,600 will be made only to students who have completed at least one year of graduate work. The usual award for students during the first year of graduate study will be $2,200.

These scholarships are intended to encourage winners to do full-time research during the summer months but the twelve-month term of award is not obligatory. Tenure may begin at any time from May 1 to October 1 ,and may be terminated by either the student or the University at any time after the end of the academic year. In case the scholarship is held for less than tewelve months, the amount will be reduced proportionately.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Tuition Bursaries. Twenty-five bursaries, covering the total fee assessment for the year of the award, are open to students who carry a full program of studies for any year of graduate study. Financial need will be considered in awarding these bursaries. They may be held in conjunction with other scholarships and graduate assistantships. These bursaries will not be awarded to students whose total fee assessment is less than two hundred dollars.

Apply to the Administrator of Student Awards by August 15.

The Francis F. Reeve Foundation Graduate Bursaries—The Francis F. Reeve Foundation offers three Graduate Bursaries valued at $2,400 each on a twelve-month basis. The awards are open to graduates of any university who are engaged in, or admissible to, a program leading to a graduate degree at the University of Alberta in any field of study for which facilities are available, and will be made on the basis of scholastic attainment and financial need. Tenure may begin at any time from May 1 to October 1.

Apply to the Administrator of Student Awards by March 1.

The Francis F. Reeve Foundation Intersession Bursaries—The Francis F. Reeve Foundation offers six Intersession Bursaries valued at $800 each. The awards are open to graduates of any university who are already engaged in a program leading to a graduate degree at the University of Alberta in any field of study for which facilities are available, and who are prepared to spend at least four months of the Intersession on research. Holders of twelve-month awards are not eligible. Awards will be made on the basis of scholastic attainment and financial need. Tenure must begin not later than June 1. While any student may apply, preference will be given to those in the humanities, social sciences and education.

Apply to the Administrator of Student Awards by March 1.

Graduate Teaching Fellowships valued at $2,400.00 for an eight-month appointment or $3,600.00 for twelve months are available in the Departments of Botany, Chemistry, English, Geology, Mathematics, Physics and Zoology. Eight-month appointments cover the period September 15 to May 15. Twelve-month appointments may be started any time between May 15 and September 15. The period May 15 to September 15 will be free for full-time research. Of these Fellowships, several are provided from funds contributed by the International Nickel Company of Canada.

Applicants must hold a bachelor's degree and be admissible to the Faculty of Graduate Studies as candidates for either the Ph.D. or Master's degree. Preference will be given to applicants who have already completed some graduate work.

Apply to Administrator of Student Awards by March 1.

The C.I.L. Fellowship—A fellowship of $2,000.00 per year plus $400.00 supplementary grant to the University is offered by Canadian Industries Limited for study and research leading to a doctorate degree in Chemistry or Chemical Engineering. The fellowship will be open to university graduates who are Canadian citizens or to university graduates who are intending to follow a career in Canada, with preference to Canadian citizens. Upon completion of the year's

work, the fellow shall submit to Canadian Industries Limited a written report outlining work performed under the fellowship or alternatively a copy of the thesis prepared for his degree. Each award shall be in respect of one year, but, in the event that a fellow shows by his progress and application that such a course is desirable, the fellowship may be awarded to the same person for a further term of one year.

A statement that the proposed research project could be carried forward satisfactorily at the University of Alberta is required from the head of the university department within which it would be conducted.

Apply to Administrator of Student Awards by March 1.

The Shell Oil Fellowship—An annual fellowship consisting of $1,800.00 to the student selected and a grant of $500 to the University, has been provided by the Shell Oil Company to sponsor research studies in Chemistry, Chemical Engineering, Mechanical Engineering, Petroleum Engineering, Geology, Physics or Geophysics leading to a postgraduate degree at the University of Alberta. The sum of $1,200.00 will be paid towards the fellow's living expenses and fees for the normal academic year; in cases where the fellow may be occupied in his postgraduate work for a full calendar year, a further $600.00 may be made available for the remaining four months. The fellowship is open annually to: (1) any science or engineering graduate of an approved Canadian university who intends to follow a career in Canada; or (2) any science or engineering graduate of an approved university who has had at least one year postgraduate study at a Canadian university and who has previously made clear his intentions to follow a career in Canada. In cases where the fellow is engaged in postgraduate studies leading to a Ph.D. degree, the fellowship may be awarded for a second year to the same person.

A statement to the effect that the proposed research project could be carried forward satisfactorily at the University of Alberta is also required from the head of the university department wthin which it would be conducted.

Apply to Administrator of Student Awards by March 1.

The Cominco Fellowship—The Consolidated Mining and Smelting Company of Canada, Limited, offers a fellowship of $1,000.00 per year to graduates in Science, Engineering or Agriculture of a recognized university, and preferably a Canadian citizen or other British subject resident in Canada, for research at the University of Alberta in some field of pure or applied science preferably related to the mining, metallurgical or chemical industry in which the company is interested. An additional sum of $500 is available for special equipment and supplies.

Apply to Administrator of Student Awards by March 1.

The California Standard Company Graduate Fellowship, valued at $1,000.00 is offered by the Califorina Standard Company to a student of the University of Alberta to undertake first-year graduate study at the University of Alberta, for research in geology, geological engineering, petroleum engineering or geophysics. The field of study should be related to oil exploration and production. A supplementary grant of $500 will be made to the department in which the fellow is pursuing gradutae studies.

A statement that the proposed study could be carried forward satisfactorily at the University is required from the head of the university department concerned.

Apply to Administrator of Student Awards by March 1.

The Robert Tegler Research Scholarship—One research scholarship of the value of $900.00 for work to be carried on at the University of Alberta is offered by the Robert Tegler Trust. This scholarship is open to graduates of the University of Alberta. The financial need of the candidate, together with other qualifications will be considered.

Apply to Administrator of Student Awards by March 1.

The Stapells Graduate Scholarship valued at $250.00 is offered by Mr. Frederick Stapells for graduate study in languages or literature or the social sciences at the University of Alberta. The scholarship is restricted to graduates of the University of Alberta, and will be paid only when the recipient registers for a full intramural graduate program.

Apply to Administrator of Student Awards by March 1.

The Henry Marshall Tory Memorial Scholarship of $300.00 is offered by the University of Alberta Alumni Association in honor of the first President of the University. It is intended to promote graduate study and research in fields related to mental health. It is restricted to graduates of the University of Alberta and will be paid only when the recipient registers for a full intramural program at the University of Alberta or at another approved graduate school.

Apply to Administrator of Student Awards by March 1.

The William Rea Scholarship in Television—Beginning with the year 1959, a scholarship of $1,000 will be offered annually by William Rea, Jr. in honor of his father, a pioneer Edmonton educator. The scholarship is open to a University of Alberta graduate or graduating student of either sex, who shows the best aptitude in terms of scholarship and extra-curricular activity for a television career in drama, music, writing, photography, engineering or business. The student may attend any recognized graduate school which will further his training in this area, and the scholarship may be renewed for one or more years in appropriate circumstances.

Definite details should be given as to the field of study in which the candidate desires to work.

Apply to Administrator of Student Awards by March 1.

The following awards are open in one Field of Study only (as listed alphabetically):

AGRICULTURE

Canadian Sugar Factories Scholarship—A scholarship valued at $500.00, open to graduates in Agriculture of the University of Alberta, is offered by Canadian Sugar Factories Limited, Raymond, Alberta. This scholarship is provided to encourage research in agriculture at the University of Alberta and in carrying out this objective special consideration will be given to a problem or problems relating to irrigation farming.

Apply to the Administrator of Student Awards by March 1.

Dan Baker Scholarship—See Undergraduate Awards, Faculty of Agriculture.

Robert Gardiner Memorial Scholarships—See Undergraduate Awards, Faculty of Agriculture.

CHEMISTRY

The Professor Osman James Walker Scholarship in Chemistry—See Undergraduate Awards, Faculty of Arts and Science, Department of Chemistry.

The Cave and Company, Ltd. Scholarship in Chemistry—See Undergraduate Awards, Faculty of Arts and Science, Department of Chemistry.

EDUCATION

The Clarence Sansom Scholarship in Education, in the amount of $500, is offered annually by The Alberta Teachers' Association to the winner of the Clarence Sansom Memorial Gold Medal in Education. The scholarship is payable upon registration for intramural graduate study during a regular winter session in the graduate school of a university of recognized standing, provided that such study be commenced not later than two years following the award.

The John Walker Barnett Scholarship in Education and the Milton Ezra LaZerte Scholarship in Education, each in the amount of $500, are offered annually to students who, having graduated with a Bachelor of Education degree from the University of Alberta, are proceeding to graduate work. Each applicant must be a bona fide resident of Alberta. He must give evidence of superior academic and professional promise, capacity for leadership, and intention to follow teaching as a career. The scholarship is payable upon registration for intramural study during a regular winter session in the graduate school of a university or recognized standing, provided that such study be commenced not later than two years following the award. Application should be made to the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton, not later than May 15.

The Du Pont Company of Canada Limited offers a scholarship of $1,500 to be awarded to: *either* (1) a graduate or graduating student in an honors course in science or Mathematics, or in a course in which science or mathematics has been a major subject, and who agrees to enrol for training as a secondary school science or mathematics teacher; *or* (2) a science or mathematics specialist already teaching in the secondary school and whose ability to teach science or mathematics would be improved by a year's postgraduate work. Both men and women are eligible. The scholarship is increased by $600 if the student is a married man. A supplementary grant of $300 will be paid to the University.

Detailed information and application forms are available from the office of the Dean, Faculty of Education, University of Alberta. Applications will be received at the same office until June 15.

Fellowships Sponsored by the Canadain Education Association.

The Imperial Oil Company Limited Fellowship in Educational Administration of $2,400.

The Canadian Text Book Publishers Fellowship in Educational Administration of $2,400.

The International Nickel Company of Canada Limited Fellowship in Educational Administration of $2,400.

The above fellowships, sponsored by the Canadian Education Association, are tenable at the University of Alberta by graduate students working at the Master's or Doctor's level. Applications for these fellowships should be made before March 1 on forms available from the Chairman, Division of Educational Administration, Faculty of Education, University of Alberta.

The W. K. Kellogg Foundation Fellowships in Educational Administration—A number of fellowships in amount up to $2,400 are donated by the W. K. Kellogg Foundation, Battle Creek, Michigan. These are tenable at the University of Alberta by graduate students working on the Master's or Doctor's level. Successful applicants will also receive travel assistance to help defray the cost of transportation to Edmonton and to cover expenses involved in field projects. Applications accompanied by transcripts of academic record and the names of three suitable references should be sent to Dr. A. W. Reeves, Chairman, Division of Educational Administration, Faculty of Education, University of Alberta, by March 1.

The Carnegie Corporation Fellowships in Educational Research—Three fellowships, two of $2,500 and one of $1,500, donated by the Carnegie Corporation, are tenable at the University of Alberta by graduate students working at the Master's or Doctor's level in Educational Research. Applications accompanied by transcripts of academic record and the names of three suitable references should be sent to the Dean, Faculty of Education, University of Alberta, by March 1.

The Alberta Teachers' Association Fellowship in Education of $2,400 is offered to residents of Alberta, who are members of the Alberta Teachers' Association, and who are admitted to the Faculty of Graduate Studies of the University of Alberta for intramural study at a regular winter session on a doctoral program in educatoin. This fellowship is open to students enrolled for doctoral work in any one of the four divisions of the Faculty of Education. Application forms are obtainable from the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton and should be returned by March 15.

ENGINEERING

The Pan American Petroleum Corporation Graduate Fellowship in Petroleum Engineering valued at $1,200.00 plus tuition and fees is offered by the Pan American Petroleum Corporation (formerly Stanolind Oil and Gas Company) to a student holding the B.Sc. degree in Engineering from any recognized university for graduate study and research at the University of Alberta in Petroleum Engineering.

Applications should be made to the Administrator of Student Awards before March 1, and should include a complete record of undergraduate work and any graduate work previously taken by the applicant.

GEOLOGY

The Pan American Petroleum Corporation Graduate Fellowship in Geology—A fellowship of the value of $1,200 plus fees is offered by the Pan American

Petroleum Corporation (formerly Stanolind Oil and Gas Company) for gradute study in the field of Geology at the University of Alberta. This fellowship is open to graduates of any Canadian University.

Apply to Administrator of Student Awards by March 1.

MEDICINE

The Alberta Tuberculosis Association Fellowship of $1,200.00 and a one-year subscription to the American Review of Tuberculosis are offered annually to a recent graduate in Medicine, who is eligible for license to practise, for the purpose of acquiring training in the field of Thoracic Diseases. It is stipulated that the holder of the Fellowship shall spend a year of study or research in Alberta, in a program approved by the Faculty of Medicine and the Association. The Faculty of Medicine will consult with the Association in awarding this Fellowship.

Apply to the Administrator of Student Awards by March 1.

The Doctor D. S. Macnab Bursary—The Calgary Associate Clinic has founded the Doctor D. S. Macnab Bursary of $250.00 available to recent graduates for the purpose of giving aid to postgraduate studies or research in Medicine or Surgery. Under special circumstances, it may be given to undergraduates.

It will be awarded by the Faculty of Medicine, and applications should be forwarded to the Administrator of Student Awards by March 1.

The Dorothy Jean Usher Memorial Scholarship for Medical Research—The Dorothy Jean Usher Memorial Scholarship for Medical Research consists of the income from a capital endowment of $10,000.00, given by Thomas Usher in memory of his daughter, a graduate of the University of Alberta School of Nursing. It is offered to a graduate or an undergraduate for research work in the Faculty of Medicine of the University of Alberta on some aspect of medicine, with preference given to investigations relating to leukaemia.

Applications should be made to Administrator of Student Awards by March 1.

PHARMACY

The Warner-Lambert Graduate Fellowship of the value of $1,200 is offered annually by the Warner-Lambert Company of Canada for five years, beginning 1958, to a student of outstanding merit undertaking graduate work in Pharmacy. A supplementary grant of $300 for equipment and supplies will also be made to the Faculty of Pharmacy.

The Pfizer Research Scholarship of the value of $300.00 is offered annually to a student of outstanding merit undertaking graduate work in Pharmacy.

AWARDS MADE BY OTHER INSTITUTIONS

It is requested that any student who is awarded one of these, report such to the Administrator of Student Awards as a matter of information.

The following awards are open in two or more Fields of Study.

British Council Scholarships. Three scholarships are offered annually to graduates of Canadian universities to provide opportunity for advanced study or research in the United Kingdom. They are not primarily intended to enable the holders to obtain University degrees or other professional or practical qualifications, although with special permission they may be allowed to do so if this does not involve an extension of the scholarship period. Preference is given to candidates who are between 25 and 35 years of age. The scholarships are normally tenable from October 1st for one academic year of ten months or for two academic years (22 months). A full scholarship includes fares to and from the United Kingdom, tuition fees, personal maintenance grant, a grant for books and apparatus of £10 per annum and approved travelling expenses in the United Kingdom. The scholar must return to his own country at the end of his scholarship.

Prospective applicants should write for further information and application forms to The Canadian Universities Foundation, 77 Metcalfe St., Ottawa 4, Ontario. Completed applications are due December 1 for scholarships commencing the following October.

The Canada Council Awards—These are provided in the fields of the arts (defined as architecture, the arts of the theatre, literature, music, painting, sculpture, the graphic arts and other similar creative and interpretative activities), the humanities and the social sciences.

They are in ten categories as follows: (In most cases these are tenable either in Canada or abroad. In all cases application should be made direct to The Canada Council by the dates mentioned.)

1. Pre-Master's Scholarships. Value $1,500. November 15.
2. Pre-Doctor's Fellowships. Value $2,000. January 10.

3a. Senior Research Fellowships in the Humanities and Social Sciences. Value $4,000-$4,500. November 15.

3b. Senior Arts Fellowships. Value $4,000-$4,500. November 15.

4. Arts Scholarships. Value $2,000. March 1.
5. Scholarships for Secondary School Teachers and Librarians. Value $2,000. January 31.
6. Scholarships for Arts Teachers and Professional Staff Members of Art Galleries and Museums. Value $2,000. November 15.
7. Grants in Aid of Research and other Productive Scholarships. Value $300-$1,200. January 20.

8. Non-Resident Fellowships.
9. Fellowships for Journalists etc.
10. Special awards.

Travel grants may be given in addition where necessary.

Further information may be obtained from the Administrator of Student Awards or by writing direct to The Canada Council, 140 Wellington St., Ottawa.

The Canadian Federation of University Women Fellowships. The Federation offers four fellowships annually to women who hold a degree from any Canadian University. The awards are based on evidence of character, intellectual achievement, and promise of success in the subject to which the candidate is devoting herself. The proposed place and plan of study must be approved by the Federation.

The four fellowships are as follows:

(1) **Travelling Fellowship** of $2,500. This is open to applicants of not more than 35 years of age, at the time of award and whose domicile is in Canada, although an applicant may be studying elsewhere at the date of application. Preference will be given to candidates who have completed one or more years of graduate study in scientific research or research in the humanities.

(2) **Margaret McWilliams Fellowship** of $2,000. This is open to applicants who wish to carry out post-graduate study or research abroad. Preference will be given to those who have already started their graduate study.

(3) **Junior Fellowship** of $1,500. This is open to applicants not more than 25 years of age at the time of award and whose domicile is in Canada, although an applicant may be studying elsewhere at the date of application. Preference will be given to students who have studied in only one university and who desire to continue their studies in another.

(4) **Professional Fellowship** of $1,000. This is open to applicants of not more than 35 years of age at the time of award and whose domicile is in Canada. Preference will be given to candidates who have completed one or more years of professional work and who desire to spend a year at an accredited Library School, College of Education, or similar profession school.

Applicaiton blanks and further information may be obtained from the Chairman of the Fellowship Committee, Dr. Mary Winspear, 18 Severn Avenue, Westmount, Montreal 6. Applications and all other necessary documents must be received in Montreal not later than February 1.

The Commonwealth Scholarship and Fellowship Plan. Under the Commonwealth Scholarship and Fellowship Plan various Governments within the Commonwealth are providing scholarships and fellowships, mainly for post-graduate work, tenable in their countries by men and women from other parts of the Commonwealth. It is expected that there will be at least one thousand such awards. Each country will accept a given number of students and will

make the awards for these, and will decide the distribution, within the Commonwealth, of the countries from which they will invite applicants. It is anticipated that the United Kingdom will offer 500 and Canada 250.

Scholarships will normally be for a period of two years and will likely cover all travel and other expenses.

Applications will be accepted by and screened by the agency set up for this purpose in the sending country, but final selection will be made by the receiving country.

It is expected that the final application date for the 1961-62 session may be December 31, 1960, but interested students should enquire early.

Apply for information to Administrator of Student Awards.

The 1851 Exhibition Science Research Scholarship—Three of these scholarships are granted each year in Canada and may be applied for by the students of eleven Canadian universities, of which this University is one. They are to the value of £250 (plus £250 provdied by the National Research Council of Canada) per annum for two, or in rare instances, three years, together with certain possible allowances for fees and travelling expenses. The object of the scholarship is "to enable selected students of overseas universities who have already completed a full university course and given evidence of capacity for scientific investigation to devote themselves for two years to research work under conditions most likely to equip them for practical service in the scientific life of the Empire".

A candidate must be (a) a British subject, (b) less than 26 years of age, except in very special circumstances, such as national service during the war. The candidate must have been a student of science in a university or university institution for a period of not less than three years, and must have spent one full academic year ending not more than twelve months prior to the date of recommendation at the institution by which he is recommended.

For the present the scholarship is normally tenable in the United Kingdom.

Students intending to apply for this scholarship should communicate with the Administrator of Student Awards before February 1.

The Imperial Chemical Industries and The Turner and Newall Research Fellowships. These fellowships are tenable at the University of London and are of the value of £800-£1,000 per annum for three years.

The Imperial Chemical fellowships are for study in Biochemistry, Chemistry, Chemotherapy, Engineering, Metallurgy, Pharmacology or Physics.

The Turner and Newall fellowship is for study in Engineering, Inorganic Chemistry or Physics.

Detailed regulations and applications may be obtained from the Academic Registrar, University of London, Senate House, W.C.I. They must be received complete by him by April 30.

The Imperial Order Daughters of the Empire War Memorial I Postgraduate Overseas Scholarship—The scholarship, founded by the Imperial Order Daughters of the Empire, as part of the war memorial of the order, is of the value of $2,000.00, tenable for one year in any university in the British Common-

wealth, the subjects of study being specified as History, Economics or Constitutional Government, or any subject vital to the interest of the Empire.

The selection of a candidate will take place during the month of November. The candidate selected must be prepared to begin his or her course in Great Britain in the following autumn.

Candidates may be men or women. They must be British born, naturalized allies, or naturalized neutrals, with at least five years' residence in Canada and unmarried. Except in the case of a returned soldier, sailor or airman, they must have passed their nineteenth but not their twenty-seventh birthday in October of the year during which they begin their course. Each candidate must hold a degree from a recognized university or degree-granting college in Canada and must have done or be doing postgraduate work. A candidate shall apply in the province in which the university from which he or she graduates is situated, irrespective of his or her place of residence in Canada. In provinces where there is no university, the War Memorial Committee in that province may grant the scholarship to a man or woman from that province who has graduated from any Canadian university or college and has done or is doing postgraduate work. Candidates from a province having no university may apply only in that province, not in the province where they are attending college or have taken a degree.

In choosing the scholars, the Committee of Selection will give consideration not only to literary and academic attainments, but also to personal character and physical fitness. If possible, personal interviews with the candidates will be arranged. Other conditions being equal, preference will be given to a returned soldier, his sister, son or daughter.

Application is to be made to the I.O.D.E. Scholarship Secretary, Mrs. C. B. Linton, 11418 - 101 Street, Edmonton, Alberta, not later than October 15.

The following students have obtained this scholarship: 1922, Bertha Lawrence; 1924, John Wesley McClung; 1926, James Brown; 1927, Marjorie Sherlock; 1928, Marian M. Gimby; 1929, Matthew Henry Halton; 1930, Margaret M. Roseborough; 1931, Harriet Maud Riley; 1932, Kenneth F. Argue; 1933, Cyril Nisbet Tingle; 1934, Helen Laura Sorenson; 1935, Doris Elizabeth Carscallen; 1936, Patricia Evelyn Parker; 1937, William Harold Epstein; 1938, Phyllis May Brewster; 1939; William Gray Scott; 1940, William Gray Scott; 1941, 1942, 1943, 1944, 1945, not awarded; 1946, James Ernest Gander; 1947, Hubert William Harries; 1948, Ronald Ralph Jeffels; 1949, Ronald Ralph Jeffels and John Ogwen Parry (resigned); 1950, John Keith Johnstone; 1951, John Keith Johnstone; 1952, Ross Gibson Robinson; 1953, George Zytaruk; 1954, Allam Thomas J. Carins; 1955, John Ross McGregor; 1956, Ian William Adam; 1957, Norman Leslie McLeod; 1958, Robert Vincent Kubicek; 1959, Frederick G. Hulmes; 1960, John Irvin Daeley.

The Imperial Order Daughters of the Empire War Memorial II Postgraduate Overseas Scholarships—Four scholarships for Canada founded by the Imperial Order Daughters of the Empire, as part of their memorial for World War II, are of the value of $2,000.00 each and are tenable for one year in any university in the British Commonwealth, the subjects of study being specified as History, Philosophy, English or French Literature.

Candidates may be men or women, and must hold a degree from a recognized university or degree-granting college in Canada, and must have done or be doing postgraduate work. The terms of award are otherwise similar to those outlined above for the World War I Memorial Scholarship.

Graduates of the University of Alberta should make application to the I.O.D.E. Scholarship Secretary, Mrs. C. B. Linton, 11418 - 101 Street, Edmonton, Alberta not later than October 15.

The following students have obtained this scholarship; 1953, Howard B. Singleton; 1959, Gordon R. Morisset; 1960, Gordon R. Morisset.

Imperial Oil Graduate Research Fellowships—The Imperial Oil Limited, in 1946, established for annual competition five research fellowships now having a potential value of $4,800.00 each ($1,600.00 per year payable in Canadian funds for a maximum of three years), open to graduates of any approved university in Canada. In addition supplementary amounts of $750.00 each may be given for up to three summer periods if the fellow continues his thesis work during such periods. These fellowships are offered for graduate study leading to a Doctor's degree in the fields of chemistry, physics or engineering (two fellowships), geology (one fellowship), economics, psychology, sociology or business administration (one fellowship), humanities such as English, ancient and modern languages, history, philosophy (one fellowship). Nomination of students for these fellowships is made by the University, such nominations being submitted to the Imperial Oil Scholarship Committee, Imperial Oil Limited, 111 St. Clair Ave. West, Toronto, not later than March 1, each year. Nomination forms and information as to the terms of the fellowships are available at the Student Awards Office.

The International Nickel Graduate Research Fellowships have been established to promote and encourage academic research in the technical fields serving the Canadian metal industries and to further public interest in industrial science in Canada. A number of fellowships are available annually, having a possible tenure of three years each. The amount of each fellowship is $2,500.00 per academic year, $2,000.00 payable to the fellow through the university to which the fellowship has been awarded and $500.00 to be at the disposal of the directing professor for necessary materials or equipment.

Applications on behalf of competent graduate students from any Canadian University qualified to confer the Master's or Doctor's Degree will be considered in the acceptable fields of research as follows: (a) Geology (including Geophysics); (b) Mining; (c) Ore Dressing; (d) Metallurgy (both process and physical); (e) Chemistry (pertaining to metals); (f) physics (pertaining to metals); (g) Mathematics. Universities desirous of receiving one or more of these Fellowships should address their applications to The International Nickel Company of Canada, Ltd., 55 Younge Street West, Toronto, Ontario, to reach it not later than February 14.

Any student who wishes to be considered for this award should apply by letter to the Administrator of Student Awards not later than January 15.

The Johnson Foundation Graduate Scholarship Award—The Johnson Foundation, Racine, Wisconsin, makes available annually to at least one graduating student registered at a Canadian University an award of a maximum

value of approximately $1,800, according to need, to cover the cost of travel and one academic year of study at a United States University or College of the student's selection. The period may be spent in graduate study in any field.

Applications should reach the Administrator of Student Awards not later than November 15 so that they may be forwarded to Brantford, Ontario by December 15.

The Massey Foundation Fellowships each of $2,000 per annum, are offered to Canadian citizens for graduate study at the American University, Washington, D.C. Applicants must have received, or be close to completing, a Bachelor's degree with high standing, and must be eligible for admission to graduate study at the American University. Applications fully documented, must reach the American University not later than March 1 of each year. For further information write to the office of the Director of Admissions, the American University, Washington 16, D.C.

The J. M. MacEachran Essay Prizes are offered annually by the Philosophical Society of the University. The essay competition of the society is open to all undergraduate students and prizes are awarded for the three best essays.

Full details of the competition are announced each year by the Philosophical Society.

The National Federation of Canadian University Students Interregional Study Exchange Plan—By an arrangement with certain universities of Canada, undergraduate scholars may apply for a year's study at another Canadian university in a region other than the one in which the student is attending. For this purpose Canada is divided into regions as follows: Western Region, English Central, French Central and Atlantic Region. To be eligible, the candidates must be *bona fide* students who have completed the equivalent of one year of university work, following complete senior matriculation, and must undertake to return to the University of Alberta at the expiration of the scholarship year. When accepted the successful candidates will be permitted to take the following year's work at the "exchange" university without paying tuition. Travel assistance will be given by N.F.C.U.S. (through a grant from Canada Council).

Application must be completed by February 15. For further information apply to the president of the students' union, or to the N.F.C.U.S. representative or to the Administrator of Student Awards.

The National Research Council Scholarships—The National Research Council offers annually postgraduate scholarships on a twelve-month basis to graduates with pre-eminent ability in the sciences, mathematics, engineering and applied psychology. These are offered in four classes: Bursaries (in Canada only) to the value of $1,800; Studentships (in Canada only) to the value of $2,200; Special Scholarships (outside Canada) to the value of $2,200; Postgraduate Overseas Fellowships (outside Canada and United States) to the value of $2,700 single and $3,500 married. The above amounts were those in effect for the 1959-60 session.

In all cases a travel allowance is made where necessary.

Application forms and general regulations may be secured from the Administrator of Student Awards, University of Alberta. Completed applications must be received by the Council in Ottawa by February 1.

The Rhodes Scholarship—A Rhodes Scholarship is tenable at the University of Oxford and may be held for three years. Since, however, the majority of Rhodes Scholars obtain standing which enables them to take a degree in two years, appointments are made for two years in the first instance, and a Rhodes Scholar who may wish to remain for a third year will be expected to present a definite plan of study for that period satisfactory to his College and to the Rhodes Trustees.

Rhodes Scholars may be allowed, if the conditions are approved by their own College and by the Oxford Secretary to the Rhodes Trustees, either to postpone their third year, returning to Oxford for it after a period of work in their own countries, or to spend their third year in post-graduate work in any university of Great Britain, and in special cases at any university on the continent of Europe, the overseas Dominions, or in the United States, but not in the country of their origin.

The stipend of a Rhodes scholarship is fixed at £750 per year. At most colleges and for most men this sum is not sufficient to meet a Rhodes scholar's necessary expenses for term time and vacations, and scholars who can afford to supplement it by say £50 per year from their own resources will find it advantageous to do so.

CONDITIONS OF ELIGIBILITY—A candidate, to be eligible, must:

1. Be a British subject, with at least five years' domicile in Canada and unmarried. He must have passed his nineteenth, but not his twenty-fifth birthday on October 1 of the year *for* which he is elected.
2. Have reached such a stage in his course at one of the universities of Canada that he will have completed at least two years at the university in question by October 1 of the year *for* which he is elected.

Candidates may apply either for the province in which they have their ordinary private domicile, home or residence, or for any province in which they have received at least two years of their college education before applying.

In that section of the will in which he defined the general type of scholar he desired, Mr. Rhodes wrote as follows:

"My desire being that the students who shall be elected to the scholarships shall not be merely bookworms, I direct that in the election of a student to a scholarship, regard shall be had to:

(1) his literary and scholasitc attainments,

(2) his fondness for and success in manly outdoor sports such as cricket, football and the like,

(3) his qualities of manhood, truth, courage, devotion to duty, sympathy for and protection of the weak, kindliness, unselfishness and fellowship, and

(4) his exhibition during school days of moral force of character and of instincts to lead and to take an interest in his schoolmates, for those latter attributes will be likely in after life to guide him to esteem the performance of public duty his highest aim."

Full particulars can be obtained from Mr. J. Duby, 11423 - 80 Avenue, Edmonton, Alberta, Secretary of the Selection Committee for the Province of Alberta.

Each candidate for a scholarship is required to make application to the Secretary of the Committee of Selection in the province in which he wishes to compete not later than November 1.

The Rhodes scholars hitherto elected from this University are as follows: 1913, Walter Farrel Dyde; 1915, Henry Grattan Nolan; 1917, Henry Alexander Dyde; 1918, Alan Burnside Harvey; 1919, Daniel Roland Michener; 1920, Walker Dunham; 1921, George Victor Ferguson; 1922, Stuart Perry Hamilton; 1923, Robert Lincoln Lamb; 1924, John McIntyre Cassels; 1925, Edward Hunter Gowan; 1926, Clarence Sutherland Campbell; 1928, Ronald Martland; 1929, George Francis Gillman Stanley; 1930, Hugh Whitney Morrison; 1931, Kenneth Wilfred Conibear; 1932, Edward Alexander McCourt; 1933, Stanley Rands; 1934, Robert Lloyd Doull Fenerty; 1935, Donald Robert Wilson; 1936, Mark McClung; 1937, John Charles Garrett; 1938, Ralph Edgar Collins; 1939, Douglas Richard Crosby; 1940, Neil Victor German; 1941, 1942, 1943, 1944, 1945, not awarded; 1946, John Alpine Dougan, Victor Ernest Graham; 1947, Marcel Joseph Aimè Lambert; 1948, Richard Laurence Gordon; 1949, Stanley Robert Mealing; 1950, Crawford Ferguson; 1951, Peter M. Roberts; 1952, John Duby; 1953, David C. McDonald; 1954, James Edward Redmond; 1955, Hugh John Lawford; 1956, Arthur Kroeger; 1957, Claus A. Wirsig; 1958, Gray Conrad Vernon; 1959, Morton Brown; 1960, Henry Russell Glyde.

Rotary Foundation Fellowships. These are provided by Rotary International for graduate study in a country other than the student's home country. Applicants must be single, and must be over 20 but not over 29 years of age. Preference will be given to studies in the humanities, languages or social sciences but other fields will be considered.

The fellowship is for one academic year and covers return travel, tuition fees, books, living and incidental expenses. Rotary District No. 536, comprising Alberta and adjacent parts of Saskatchewan and British Columbia selects such a candidate every other year.

Application should be made by August 1 of any even-numbered year for the fellowship to begin in the next following odd year. Apply to the Administrator of Student Awards.

Royal Society of Canada Research Scholarships—The Royal Society of Canada will award two types of research scholarships to Canadians for advanced work:

Post-doctoral scholarships of $2,500.00 each for candidates who have obtained the degree of Doctor of Philosophy or equivalent in any branch of science or literature.

Pre-doctoral scholarships of $1,500.00 each in the humanities. The subject of investigation must, however, have been selected and preliminary work done on it, as the award cannot be given to assist in meeting course or examination requirements for the Ph.D.

Copies of regulations and forms of application may be obtained from the Secretary, The Royal Society of Canada, National Research Building, Ottawa, Ontario. Applications and all supporting papers must be in the hands of the Secretary not later than January 1.

The Rutherford Scholarship of the Royal Society—of the value of £600 to £800 per annum is available for experimental research in any branch of the natural sciences, but if there are candidates of similar merit preference will be given to experimental physcis.

Applications should be made not later than Febrary 1 on the Exhibition of 1851 forms.

Shell Postgraduate Scholarships. Two scholarships of £750 each per annum for two years are offered to male British subjects with at least 5 years residence in Canada, under 25 years of age and preferably unmarried. Travel assistance may be given.

These scholarships are tenable in an approved University in the United Kingdom in any of the following studies: Chemistry, Physics, Chemical Engineering, Engineering, Geophysics or Geology. The student should be working to a Master's or Doctor's degree and should already have completed or expect to complete one year of postgraduate study.

Information may be obtained from the Administrator of Student Awards and applications must be in Ottawa by January 31.

Soroptimist Federation of the Americas Inc. The Western Canada Region of the Federation offers annually a fellowship to a woman student, either graduating or a graduate, whose home is in Western Canada, and who is in need of financial assistance. The award is for postgraduate study at any university. The amount of the award is $750 for the first year of study and the student may apply for a renewal for a second and a third year.

Application forms may be obtained from the Administrator of Student Awards. They must be forwarded to the Federation by March 1. A decision will be made by June 30.

The Woodrow Wilson National Fellowships, each providing a stipend of $1,500 for one year, plus tuition costs and allowances for dependents, are available to outstanding students who are either undergraduates in their final year or graduates who have not yet entered a liberal arts graduate school. The intention of all applicants must be to prepare themselves by graduate study for a career in college teaching in the natural or the social sciences or the humanities. These are tenable in the United States or Canada.

In the first instance, candidates are nominated by faculty members. Since nominations must reach the officers of the Fellowship Foundation no later than October 31 for Fellowships tenable in the next academic year, intending candidates should get in touch with the head of the department concerned as early as possible in the first term.

The following awards are open in one Field of Study only, as listed alphabetically.

DENTISTRY

The Canadian Dental Association War Memorial Essay Prizes—Two prizes, the first of $125.00 and the second of $75.00, are offered by the Canadian Dental Association as a memorial to Canadian dentists who made the supreme sacrifice in World Wars I and II. The prizes will be awarded for the best essays written by fourth year dental students throughout Canada upon a topic to be announced in September of each year.

This essay is part of the requirements for fourth year students in the University of Alberta.

Further information may be obtained from the Dean of Dentistry or from the Administrator of Students Awards.

The Graduate Dental Research Fellowships—The National Research Council offers annually a limited number of Fellowships for promising graduates in dentistry who have spent at least one year in postgraduate training or who have had experience in research work. Applications must be received by the Council by February 1. Application forms and general regulations may be secured from the Administrator of Student Awards.

The Canadian Dental Association Studentships—The Canadian Dental Association offers studentships to suitable students or graduates who desire to prepare themselves further for scientific research by continuing their study in the sciences fundamental to their research fields.

An applicant must be a Canadian citizen resident in Canada. Factors considered in making the awards are: evidence of capacity for original research, scholastic ability in scientific fields, previous training, age and marital status.

The candidate shall state the institution at which he intends to study and the general line of work to be followed. A transcript of university record and a letter of recommendation from the dean of a dental school should accompany the application.

Applications will be considered in September, January and May, and should be addressed to the Secretary, Canadian Dental Association, 211 Huron Street, Toronto, Ontario.

The M. H. Garvin Scholarship Fund in Dentistry has been established by the Western Canada Dental Society to encourage and facilitate the studies or research work of undergraduates, or graduates in the most recent graduating class, of the Faculty of Dentistry.

Awards from the fund will be made on the basis of scholastic aptitude and attainment, professional and personal qualification and financial need. The amount of the awards, the frequency with which they are made, and the applicants who are to receive them will be determined by a committee consisting of the President and two vice-presidents of the Western Canada Dental Society.

Applications for grants from this fund should reach the Administrator of Student Awards by June 15.

DRAMA

The Elizabeth Sterling Haynes Memorial Scholarships are offered by the Canadian Women's Theatre Guild. Two scholarships of $150.00 each are available in theatre art (directing, playwriting, acting, stagecraft) to students 18 years of age or over enrolled at the University of Alberta in Edmonton or residents of the city.

Application forms should be received by the chairman of the Scholarship Committee, Miss Ruth Hyndman, 11131 - 82 Ave., Edmonton, on or before April 15.

ENGLISH

The Canadian Chapter, Beta Sigma Phi, offers annually three scholarships of $1,000.00 each, one of which is restricted to the Western Canada region. The scholarships will be tenable in the fourth year of an Honors Course in English. They will be awarded at the end of the third year on a basis of academic accomplishment and a confidential assessment of the student's ability by his or her teachers in English courses.

Apply to Dr. T. H. Matthews, Executive Secretary, National Conference of Canadian Universities and Colleges, 77 Metcalfe Street, Ottawa 4, Ontario, by June 1. For further information refer to Administrator of Student Awards, University of Alberta.

ENGINEERING

The Athlone Fellowships—Her Majesty's Government in the United Kingdom has established a number of Fellowships to enable Canadian engineering graduates to take postgraduate training in the United Kingdom. The fellowships will be in two groups:

(a) thirty-one available for graduates immediately after graduation, of which two have been allotted to the University of Alberta;

(b) a further ten available for graduates who have already spent some time in industry.

The Fellowships will cover the costs of transport, tuition fees and maintenance and be tenable normally for a maximum period of two years.

Application must reach the Administrator of Student Awards by January 6.

Canadian Good Roads Association Scholarships—Several scholarships, each valued at $2,000.00 and tenable for one year, are offered annually through the Canadian Good Roads Association for graduate study in Transporation Engineering.

Applications should reach the Association at 270 McLaren Street, Ottawa, not later than April 15.

Further information may be obtained from the office of the Dean, Faculty of Engineering.

The Franki Fellowship, of $1,750.00 per year plus $250.00 to cover expenses in connection with the research, is offered by Franki Company of Canada, Limited, for graduate research in the field of soil mechanics at a Canadian university. The fellowship is open to any graduate in civil engineering of a recognized university and preferably a Canadian citizen or a resident of Canada.

A candidate for this fellowship should document his application with a transcript of university marks, a statement of experience and a clear outline of the research project contemplated. He should also request three or more instructors familiar with his work to send to the Administrator of Student Awards confidential staments indicating the merits of the applicant and their estimate of his ability to pursue graduate work. *A statement that the proposed research project could be carried forward satisfactorily at the University of Alberta is required from the head of the university department within which it would be conducted. A copy of the thesis is to be submitted to the donor.*

Applications should reach the Administrator on or before April 1, in order that they may reach the company not later than April 15. The decision of the company will be known not later than June 1.

Steel Company of Canada Fellowships in Metallurgy. Four fellowships of $2,000 each are offered annually to permanent residents of Canada who are graduates of a Canadian University, for research in Metallurgy. They are normally tenable for one year but in special circumstances may be renewed for a second year.

Further information may be obtained from the Administrator of Student Awards, University of Alberta. Completed applications must be sent to Canadian Universities Foundation, 77 Metcalfe St. Ottawa. Applicants should enquire by April 1.

Webb Memorial Student Paper Competition—Each year the Engineering Students' Society awards three prizes of $50.00, $30.00 and $20.00 for the three best student papers written and presented to the Society at its regular meetings. To be eligibile, a student must be a member of the Engineering Students' Society. The rules of the competition are set forth in the Society's constitution.

LAW

The Carswell-Sweet and Maxwell Scholarship in Law—From 1960 a scholarship will be offered to be open to all final year and postgraduate law students in Canada, and which will be tenable for one year at Cambridge University. The student will be required to do postgraduate work in Anglo-Canadian Law. The value of the scholarship will be $2,000.00 and the cost of travel to Great Britain and return will be paid in addition. Application forms may be obtained from the Dean of the Faculty of Law.

The Viscount Bennett Trust Fund Scholarship—Under the terms of a deed of gift to the Canadian Bar Association from the late Right Honorable Viscount Bennett, P.C., K.C., LL.D., D.C.L., Honorary Life President of the Association, a trust fund known as the Viscount Bennett Trust Fund has been established. The annual income from the fund or the sum of $1,000, whichever is the less, will be paid annually as a scholarship for postgraduate study of law at an approved graduate school.

The scholarship is open to final year and graduate students of approved Canadian law schools, of which the Faculty of Law of the University of Alberta is one.

For further information and application forms apply to the Administrator of Student Awards. Applications for this scholarship should be received by the Dean of the Faculty of Law before October 15.

NURSING

Professional Training Grants—Financial assistance is available to graduate nurses pursuing post-graduate study in any field of nursing. Applicant should be made to the Deputy Minister of Health, Department of Public Health, Administration Building, Edmonton, Alberta.

The University of Alberta Hospital School of Nursing Alumnae Association Scholarship—Financial assistance is available to graduates of the School to

undertake post-graduate work in any field of nursing. Applications should be addressed to the Secretary of the Alumnae Association c/o, Office of Director of Nursing, University of Alberta Hospital.

SOCIAL WORK

Alberta Chapter Canadian Foundation for Poliomyelitis and Rehabilitation—Three bursaries, of the value of $350.00 each, are offered annually by the Alberta Chapter, Canadian Foundation for Poliomyelitis and Rehabilitation. These may be applied for by students from the University of Alberta who have, or expect to have, a first undergraduate degree and who wish to take a course in Social Work (specializing in the medical phase) at a recognized School or University in Canada. Both academic standing and financial need may be considered. It is hoped that such students will return to Alberta to engage in their work.

Apply to the Administrator of Student Awards by June 15.

The Imperial Order Daughters of the Empire Bursary in Social Work of $500.00 is offered to a graduate of the University of Alberta to take training at any recognized School of Social Work in Canada. A condition of the award is that the winner shall agree to work in an approved Social Welfare Department or Agency in the Province of Alberta for a period of two years if a suitable position is available.

Academic standing, suitability of personality, good health and financial need will be major considerations in determining this award.

Application forms may be secured from the I.O.D.E. Scholarship Secretary, Mrs. C. B. Linton, 11418 - 101 Street, Edmonton, Alberta and should be submitted to her on or before June 1.

The Junior Hospital League Bursary for Post-Graduate Study in Social Work of an amount up to $1,000 is offered to a graduate of any recognized University to assist training at an accredited School of Social Work. The winner shall agree to work in an approved Social Welfare Department or Agency in the City of Edmonton for a period of one year immediately following completion of course. The bursary will be awarded on the basis of academic proficiency, suitability of personality and financial need. Preference will be given to those who have already been employed by a Welfare Agency.

Application forms should be secured from Mrs. B. K. Mathew, 7216 - 114A St., Edmonton, and should be completed and returned to her by Mary 15.

The Kinette Bursary in Social Work up to the amount of $350.00 is offered by the Kinette Club of Edmonton to graduates of the Unviersity of Alberta, or to a graduate of another university resident in Alberta to take training at any recognized School of Social Work in Canada. Preference will be given to an applicant who intends to work in the Province of Alberta. Academic proficiency, suitability of personality and financial need will all be considered in making the award.

Application should be submitted by June 1 to Mrs. Bryson Stone, Chairman, Bursary Committee, Kinette Club of Edmonton, 9260 - 148 Street, Edmonton, Alberta.

Quota Club District 11 Scholarship in Social Work—District 11 of Quota Club International Inc., is offering a scholarship of $350.00 to the successful woman candidate chosen by the Club Scholarship Committee. The scholarship will be awarded to a student from Alberta, Saskatchewan or Manitoba on the basis of academic proficiency and financial need; a student in the field of Social Service will receive first consideration. Applicants for admission to Schools of Social Service are normally required to have a bachelor's degree and to have completed a number of courses in the biological and social sciences. Applicants who have been employed by recognized social service agencies, or by Government Departments in the field of social service work, and who have been accepted by a recognized School of Social Work are also eligible for this scholarship.

Applications should be submitted to Miss Nell Warning, 9921 - 104 St., Edmonton, Alberta, by May 31.

The P.E.O. Memorial Scholarship of the value of $100.00 is offered by the P.E.O. Sisterhood, Alberta Chapters, to a graduating woman student who intends to pursure studies in social work. The scholarship will be awarded to a student who attains at least second-class standing in her final year and will be paid only when she produces satisfactory evidence of registration in a recognized course of social work.

Applications should reach the Administrator of Student Awards by June 15.

WILDLIFE MANAGEMENT

C.I.L. Wildlife Management Fellowships—Fellowships of the value of $1,500, of which $1,200 is paid to the student and $300 to the Department in which the student is working, are available to any university graduate undertaking post-graduate studies in wildlife management at a Canadian university. Fellowship holders may receive summer grants to finance field work and provide additional income.

Applications should be forwarded by March 30 to Mr. S. J. Smart, Secretary of the Advisory Board, P.O. Box 10, Montreal.

PROVINCE OF ALBERTA ASSISTANCE

I. DEPARTMENT OF EDUCATION

Under the Students Assistance Act (The Queen Elizabeth Education Scholarship Fund) asistance in various forms is available to students at the University of Alberta.

For matriculants and undergraduates this assistance is also available for attendance in a course of University level at a Junior College which is affiliated with the University of Alberta, or at an approved College or University elsewhere if the course is not given at the University of Alberta.

For graduate study the assistance is available only for attendance in the Faculty of Graduate Studies at the University of Alberta.

Matriculants and undergraduates must be bona fide residents of Alberta.

Province of Alberta Matriculation Scholarships

Three hundred scholarships are provided for students entering University the first time who had a matriculation average of 75% or better.

For details refer to page 495.

Province of Alberta Undergraduate Scholarships

Three hundred scholarships are provided for undergraduates with an academic standing in the previous year of 75% or better.

For details refer to page 508.

Province of Alberta Graduate Fellowships

Three fellowships of $3,600 each.

For details refer to page 544.

Province of Alberta Graduate Scholarships

Ten scholarships of $2,200 to $2,600 each.

For details refer to page 544.

Province of Alberta Graduate Tuition Bursaries

Twenty-five are provided for the amount of fees.

For details refer to page 545.

Grants and Loans

These are available on a basis of financial need only. The amount of a grant depends on the academic standing of the previous year. A loan may be granted either in conjunction with, or separately from, a grant. Loans are repayable to the Provincial Government.

Matriculants must have an average of at least 60%.

Application should be made to The Secretary, Students Assistance Board, Provincial Department of Education, Administration Building, Edmonton.

Undergraduates must have an average of at least 60% for grants and at least 50% for loans.

Application should be made to the Administrator of Student Awards, University of Alberta, Edmonton, or to the Student Counselling Services Office, Calgary.

Students who anticipate that they will need financial assistance any time during the session should apply as follows:

Medicine and Dentistry—by September 15.

Other Faculties—by October 1.

However, further applications will be accepted up to January 3 from students who could not anticipate their needs earlier. Only in cases of emergency can applications be considered after January 3.

Graduate Students must have an average of at least 65% for either grants or loans.

Apply to Administrator of Student Awards early in the fall session or in January.

Assistance for Teacher Education

Special financial assistance is available in all years for Faculty of Education students.

For details refer to Province of Alberta Assistance under the Faculty of Education, page 528.

II. DEPARTMENT OF HEALTH

Medical Laboratory Science Bursaries

Bursaries may be granted only on the successful completion of the first term of the first year. They cover fees and a living allowance and may continue through the second year.

Apply to the Dean, Faculty of Medicine.

III. DEPARTMENT OF PROVINCIAL SECRETARY

Scholarships at various levels of study are available in Drama, Handicrafts, Librarianship, Music and Recreation (including Fine Arts, Psychology and Sociology). There are various application dates. For further information apply to the Administrator of Student Awards, or direct to Department of the Provincial Secretary, Cultural Activities Branch, 425 Legislative Bldgs., Edmonton.

Among these scholarships is the following:

Recreation Scholarships—The Government of Alberta is offering scholarships ranging from $200 to $400 to candidates wishing to take further training in Recreation. These scholarships are open to students entering their graduating year in Physical Education at the University of Alberta and to graduates of the University who have shown an active interest in Recreation through provision of leadership in that field, expect to enter the Recreation profession in Alberta, show a high level of scholarship ability and possess high qualities of personality and character.

Application should be made to: Department of Provincial Secretary, Cultural Activities Branch, 425, Legislature Bldg., Edmonton, Alberta, before March 31.

OTHER FORMS OF FINANCIAL ASSISTANCE

University Loan Fund—Through the generosity of private donors the University has at its disposal a Loan Fund from which loans may be made to students attending the University of Alberta, who could not otherwise complete their studies. In special circumstances loans may also be considered for Alberta students taking courses at an institution of University level elsewhere. Applicants must be making satisfactory academic progress. Interest at 5% per annum will be charged on loans. The money to establish this fund has been largely donated by Engineered Buildings, Limited, Calgary.

Apply to Administrator of Student Awards.

Leonard Foundation Scholarships—The income of a trust created by the late Lieut.-Col and Mrs. R. W. Leonard, St. Catharines, Ontario, will be expended in paying part of the college expenses of selected students at several institutions of Canada, including the University of Alberta, for from one to four years. The details of qualification and the procedure of application for these scholarships may be secured by corresponding with the trustees of the Leonard Foundation, the Toronto General Trusts Corporation, Toronto, Ontario, or with the Administrator of Student Awards of the University of Alberta. It is desirable that applications be filed in January as the last date for their receipt in Toronto is March 31 of each year.

Terwillegar Memorial Fund—This fund was established by Dr. Norman L. Terwillegar in memory of his only sons, Norman Allin, who was killed while serving with the British Navy, and William Robert, who served in the Royal Canadian Air Force and who died while attending Queen's University; both were former students of the University of Alberta.

The proceeds of the fund will be available to suitably qualified students in Medicine or Engineering in the form of loans, free of interest to the date of graduation. Application forms and further information may be obtained from the Deans of Medicine and Engineering.

The American Dental Trade Association has made available a sum of $350 annually to be issued as loans to students who have entered, or are about to enter, the final year in the Faculty of Dentistry and who require financial assistance. Application should be made to the Dean.

The Hudson's Bay Company Merchandising Awards in Arts and Science—Two cash awards of $100.00 each are offered by the Hudson's Bay Company, (one each in Calgary and Edmonton Stores) to two students on the basis of interest in and suitability for a career in merchandising. Awards will be subject to acceptance of summer employment with the Hudson's Bay Company. The awards are open to students completing the second year of a program for the general degree in Arts and Science.

Applications for these awards should reach the Administrator of Student Awards before February 1.

The Hudson's Bay Company Merchandising Awards in Commerce—Four cash awards of $100.00 each are offered by the Hudson's Bay Company (two each in Calgary and Edmonton Retail Stores) to four students on the basis of interest in, and suitability for, a career in merchandising. Awards will be subject to acceptance of summer employment with Hudson's Bay Company. The awards are open to students completing the next to final year of the Faculty of Commerce.

Applications for these awards should reach the Administrator of Student Awards before February 1.

Viscount Bennett (The Law Society of Alberta) Bursaries—The late Right Honorable Viscount Bennett, P.C., K.C., LL.D., D.C.L., of Calgary and Mickelham founded a trust with the Law Society of Alberta to support awards to students and graduates in the Faculty of Law at the Universtiy of Alberta. Bursaries may be awarded from time to time by a special committee of the Law Society. Applications, accompanied by verifiable statements of the applicant's scholastic record and financial position, may be made at any time to the Dean, Faculty of Law.

Medical Class of '41 Loan Fund—A fund has been established by the Medical class of '41 from which small loans may be made at the discretion of the Dean of Medicine. Inquiries should be made at the office of the Dean of Medicine.

Kellogg Foundation Fund Londs—Through the generosity of the Kellogg Foundation of Battle Creek, Michigan, a sum of money has been made available to serve as a revolving fund to provide a limited number of loans to needy students in Medicine or Dentistry. For particulars in regard to these, apply to the Dean of Medicine or Dentistry.

Children of War Dead (Education Assistance) Act—This act provides fees and monthly allowances for children of veterans whose death was attributable to military service. Enquiries should be directed to the nearest district office of the Department of Veterans' Affairs.

R.C.A.F. Benevolent Fund—The Royal Canadian Air Force Benevolent Fund has made provision for loans for the benefit of former R.C.A.F. personnel or their dependents. Information may be obtained from the Administrator of Student Awards.

The P.E.O. Educational Loan Fund—This fund has been established by the P.E.O. Sisterhood for the purpose of assisting young women, properly and satisfactorily recommended and desiring to complete their higher education with a view to becoming self-supporting.

Loans are not made for a longer term than five years. They shall not exceed $500.00 to any applicant for one year of study or $1,000.00 for two or more years of study. The rate of interest is 3%. Since arrangements for loans require considerable time, applications should be placed as early as possible, preferably by August 1.

Further information concerning this loan fund may be secured from the Administrator of Student Awards.

The Polish Canadian Students Assistance Fund of Alberta.—The Polish Community of Alberta has provided a fund for a limited number of prizes, bursaries and loans. These are for students at the University of Alberta in any year or course, or for matriculants entering first year. Such students must be of Polish origin and should be interested in making a contribution to the understanding of Polish culture and to the development of Polish Community affairs. Both academic standing and financial need will be considered. The recipients will be chosen by the donors.

Apply, giving full particulars, to the Administrator of Student Awards by September 30.

The Harry F. Bennett Educational Fund—This loan fund has been established by members of the Engineering Institute of Canada in memory of the late Harry F. Bennett, M.E.I.C.

Loans from this fund are available to deserving students in the Faculty of Engineering who have successfully completed their first year and are in need of financial assistance. The maximum loan in any year is $240.00 and for all years $450.00.

Application forms and further information concerning this loan fund may be obtained from the Dean of Engineering.

UNIVERSITY OFFICER TRAINING UNITS

THE REGULAR OFFICER TRAINING PLAN

Introduction

The Regular Officer Training Plan (ROTP) is in operation in the Canadian Services Colleges and in Canadian universities. The plan is a form of mutual assistance to the armed forces and to young Canadians seeking advanced education.

The expanding defence program at home and abroad has created a demand for a large number of officers for the three armed services to meet current and future requirements. The Royal Canadian Navy, the Canadian Army, and the Royal Canadian Air Force have previously met their career officer requirements by enrolling graduates from the Services Colleges, as well as by promoting personnel from the ranks. The increased requirement now exceeds by far the numbers obtainable from these sources.

In consideration of these factors, the Regular Officer Training Plan will utilize the teaching facilities of the Services Colleges with their blending of military and academic training, and additionally will direct many ROTP cadets to civilian universities. The plan is thus designed to produce officers of high quality with university-level training to meet the needs of the services. It also aims to encourage large numbers of students, who would otherwise be unable to afford a university education, to continue their education with government sponsorship and financial assistance.

The Regular Officer Training Plan

Under ROTP, successful applicants who have completed senior matriculation are enrolled in the armed force of their choice, and are provided with university training. Students who are selected for the ROTP whilst attending university will be enrolled in the armed force of their choice while continuing their university studies.

Training in the ROTP is divided into two phases each year. Cadets will attend their university for the academic term and then will be sent to a unit of the forces in which they have been enrolled for summer practical training.

Academic Training

In general terms it can be stated that all courses which are applicable to business and industry are also applicable to the armed forces. Courses are, therefore, offered in the following broad patterns:

Engineering—Civil, Mechanical, Electrical, Aeronautical, Engineering Physics, Chemical.

Arts—General, Honors, Pure Science.

Specialist Courses—Other specialist courses required by the armed forces. (If any course exceeds four years, the student will be accepted in his final four years.)

The greatest requirement is for technically qualified officers, so that the major proportion of selected candidates will be required to accept training in engineering and science faculties.

Conditions of Service

Successful applicants will be enrolled as Naval Cadets in the Royal Canadian Navey, Officer Cadets in the Canadian Army, and Flight Cadets in the Royal Canadian Air Force, according to their choice. They will attend the college or university selected. Undergraduates will complete the summer practical training program as do the reserve personnel of the appropriate university—Naval Training Division (RCN), Canadian Officers' Training Corps (Canadian Army), or University Reserve Training Plan (RCAF).

On successful completion of academic and military training, cadets will be promoted to commisioned officer rank in the regular force. *The privilege of release, if desired, will be granted after three years' commissioned officer service beyond graduation.*

Cadets are obliged to maintain good standing academically in college and throughout military training. A cadet who fails a year, or who lacks adequate standing in any subject of a previous year, loses his benefits. He may, on the recommendation of the faculty and the service concerned, be permitted to attend a year at his own expense and may, if successful, be reinstated.

Financial Assistance

The cost of tuition and other essential fees will be borne by the Department of National Defence. The scale of pay and allowances for cadets under this plan is:

During the periods of attendance at university (academic year), cadets receive:

	Per month
Pay	$ 63.00
Subsistence Allowance (where food and lodging is not provided)	65.00
TOTAL	$128.00

During the period of practical summer training, cadets receive:

Pay	$ 63.00

(Plus free rations, quarters and travel)

An allowance of $75.00 per year is made for the purchase of books and instruments.

Students in the Faculty of Dentistry will be allowed the full cost of expendable instruments and supplies for the four years, as approved by the Faculty.

Free medical and dental care and annual leave with full pay and allowances will be received throughout the entire training period.

Admission Requirements

Applicants who possess the following qualifications will be considered for selection:

Citizenship—Canadian citizen; British subject resident in Canada.

Marital Status—Must be single and remain so during academic training.

Medical—Must be fit for enrolment in the branch and service of his choice.

Age—Must have reached sixteenth but not twenty-first birthday on January 1 of year of entry into university.

Education—Acceptance for entrance to the University of Alberta.

Selection of Candidates

As future officers of the armed forces, applicants for the ROTP will appear before military interview boards for selection and will be assessed on their academic abilities, personality, character, appearance and leadership qualities.

How to Apply

Application should be made through the Officer Commanding the unit in which the applicant is interested. Offices for all three services are located in the University drill hall.

Medical Subsidization Plan

Scope

This plan applies to the three Armed Services. The plan provides for subsidization of medical students during the final three years of university and the interne year. Application may be made at any time after the commencement of the third from last academic year up to the end of the interne year.

Status

Applicants are enrolled in their initial year as an officer cadet (or equivalent). On successful completion of the first academic year under the plan the student is promoted to Second Lieutenant (or equivalent).

Benefits

		As Second Lieutenant	
	As Officer Cadet	Single	Married
Pay of Rank	$ 63 per mon.	$210 per mon.	$210 per mon.
Marriage Allowance			40 per mon.
Subsistance Allowance	65 per mon.	65 per mon.	91 per mon.
Totals	$128 per mon.	$275 per mon.	$341 per mon.

In addition all fees are paid and the student receives a grant of $75.00 for books and instruments.

Free medical and dental care and annual leave with pay are provided.

Promotion and Terms of Service

After interneship and registration with a Provincial College of Physicians and Surgeons, the officer is promoted to the rank of Lieutenant, Captain or Flight Lieutenant and will be required to serve a period of full duty for 3 years as a commissioned officer.

Dental Corps Subsidization Plan

If the applicant is found suitable by the Officer Selection Board and the Director General of Dental Services, he may be granted the rank of 2/Lt. (Second Lieutenant) as a regular officer or short-service officer during his

final 21 months at unviersity. (A short-service officer is commissioned for seven years; this term would include the period during which the officer held commissioned rank during the last two academic years.)

NOTE: Twenty-one months is the period covered by the last two academic years:

Penultimate year (September to May, inclusive)	9 months
Summer (June to August, inclusive)	3 months
Final year (September to May, inclusive)	9 months
Total	21 months

Pay of a 2/Lt. is:

	Married	Single
Pay of rank	$210 per month	$210 per month
Marriage allowance	40 per month	
Subsistence allowance	91 per month	65 per month
Totals	$341 per month	$275 per month

Cost of Tuition and Books

In addition to receiving the pay and allowances of a 2/Lt. at university, officers enrolled under this plan will have the cost of tuition paid by the Department of National Defence and will be reimbursed for actual books purchased during the subsidized years up to the maximum of $75.00 per year.

Allowance will also be made for the full cost of expendable instruments and supplies for the four years, as approved by the Faculty of Dentistry.

Promotion on Graduation

On graduation, an applicant is promoted to the rank of Captain on June 1 of the graduating year.

CANADIAN OFFICERS' TRAINING CORPS

University of Alberta Contingent

Program

The C.O.T.C. trains undergraduates for commissions in the Canadian Army (Regular or Militia). There are two phases of training: the *theoretical,* which is taken during the academic year and consists of lectures on organization and tactics, administration, leadership, military history and military law; and the *practical,* which is taken during the summer vacation with schools and units of the Canadian Army. The theoretical work is covered by two or three hours of lectures one night per week during the winter for a total of 64 hours. The practical work is done during a summer training period of twelve to twenty-two weeks duration.

Qualification

A student qualifies as a Second Lieutenant when he has taken two theoretical and two practical phases of training. By taking a third theoretical and a third practical phase he may qualify as a Lieutenant (Regular or Militia) and be promoted to that rank when he has obtained a degree.

Eligibility

Applications for training may be made by male undergraduates who are:

1. British subjects,
2. physically fit and between the ages of 17 and that which will permit him to complete the minimum qualification of 2nd Lieutenant before reaching the age limit shown below.
3. following a course of studies leading to a recognized degree.

Since C.O.T.C. training is related to the student's university course as closely as possible, the following limitations apply to entrance into corps:

		Age Limit
Royal Canadian Armoured Corps	Any faculty	30
Royal Canadian Artillery	Any faculty	30
Royal Canadian Engineers	Engineering	35
Royal Canadian Corps of Signals	Electrical Engineering, Eng. Physics	35
Royal Canadian Infantry Corps	Any faculty	30
Royal Canadian Army Service Corps	Any faculty; Commerce, Agriculture, Veterinary Science, or Mechanical, Civil, or Chemical Engineering being preferred	30
Royal Canadian Electrical and Mechanical Engineers	Engineering	35
Royal Canadian Army Medical Corps	Medicine or Pharmacy	35
Royal Canadian Dental Corps	Dentistry	35
Royal Canadian Ordance Corps	Any faculty; Arts and Science and Commerce preferred	35
Royal Canadian Army Pay Corps	Any faculty: Commerce or Economics preferred	35
Canadian Provost Corps	Any faculty: Law preferred	35
Canadian Intelligence Corps	Any faculty	30-35
Royal Canadian Army Chaplain Corps	Pre-Theology	35

Application

Candidates will apply to the C.O.T.C. Orderly Room. Subsequently they will be interviewed by the Officer Selection Board. Suitable candidates will begin their theoretical training as soon as accepted.

Status and pay

Successful candidates are appointed Officer Cadets with the status and privileges of Second Lieutenants. While at corps schools, they receive pay of that rank, i.e. $210 per month in addition to rations and quarters. By attending the 64 hours of lectures in each theoretical phase, the officer cadet can earn 16 days' pay (approximately $100).

ROYAL CANADIAN AIR FORCE

University Squadron

Object

R.C.A.F. University Squadrons were formed at the major Canadian universities to promote a strong liaison and mutual understanding between the

universities and the Royal Canadian Air Force. These squadrons will provide a flow of trained university graduates into the R.C.A.F. Regular or Reserve as commissioned officers.

Qualifications

Applicants for the University Squadron must possess the following qualifications:

(a) Canadian or British subject, male or female.

(b) Unmarried, if applying for aircrew.

(c) Age—17 to 25 years for aircrew: 17 (18 for women applicants) to 26 years for non-flying branches.

(d) Medical category as established by the RCAF.

Application

Application forms may be obtained from the Commanding Officer. The selection of Flight Cadets for the University Squadron will commence at the beginning of the fall term.

Training Program

The three-year training program consists of formal training and supervised employment at R.C.A.F. schools and stations for a minimum of sixteen weeks and a maximum of twenty-two weeks each summer. In addition, Flight Cadet and Pilot Officer members of the University Squadron attend weekly lectures and parades during each of the three winter terms preceding summer training.

Officer Development

During the first summer of training, all Flight Cadets undergo an initial Basic Officer Development Course at the R.C.A.F. Reserve Officers' School, in which they receive instruction in the duties, requirements and responsibilities of junior officers. This training involves the military, executive and development phases, which, besides the military and executive aspects of the R.C.A.F., are designed to train students as leaders who are well informed in world affairs and the role of Canada's defence forces in the current political and military situation, who are able to express themselves clearly and effectively, and who will make good officers and good citizens.

Formal Training

Aircrew trainees, most technical list and some non-technical U.R.T.P. Flight Cadets, on completion of the Basic Officer Development Course, proceed to R.C.A.F. schools to commence formal Air Force courses in their designated branches.

Aircrew

R.O.T.P. Cadets, only, may be enlisted in aircrew branches.

Candidates for flying branches must not be over 24 years of age on the date of application, must meet aircrew medical standards, and must not be married while undergoing flying training.

Winter Training Program

During the academic year, members of the University Squadron attend

weekly lectures on orientation, executive and officer development subjects. The first winter's lectures are preparatory to entry into U.R.T.P. and the Air Force. Lectures given during the second and third winters extend and amplify knowledge acquired during the officer development phases of summer training. Emphasis is placed on the integration of social and military sciences and the determination of their application to current affairs.

Officer Employment

Flight Cadets in those branches for which formal courses are not given during the summer months are employed in an "understudy" capacity at various units. This employment, which commences at the Officer Development Course, provides the students with experience in Air Force procedure and operation and allows them to observe the application of what they are taught at the Reserve Officers' School.

Status

Accepted university students are appointed in the R.C.A.F. Primary Reserve (special list, University Branch) in the rank of Flight Cadet.

Flight Cadets have the status of commissioned officers for all purposes and wear the rank of Pilot Officer.

After successful completion of three summers of training and subsequent graduation from university, Pilot Officers may be appointed to the R.C.A.F. Regular, Auxiliary or Supplementary Reserve in the rank of Flying Officer.

Pay

Flight Cadets are paid at the rates prevailing for pilot officers. Net earnings for each summer employed vary between $750 and $1,200, depending on the length of duty. Aircrew trainees receive an additional $75 per month while undergoing aircrew training. Winter pay is according to attendance at lectures and parades and amounts to approximately $100 if all sessions are attended.

Medical and dental care is provided during summer employment and first-class rail transportation is issued on posting. Flight Cadets are issued with full kit of uniform for summer and winter wear upon acceptance.

For detailed information concerning Reserve University Squadron and R.C.A.F. (Regular), consult the Commanding Officer of the Squadron.

UNIVERSITY NAVAL TRAINING DIVISION

Object

University Naval Training Divisions have been instituted by the Royal Canadian Navy in Universities across Canada to provide an opportunity for suitable young men to perform officers' training while they are undergraduates and thereby prepare themselves for promotion to commissioned rank in the Regular Force or the Reserve on graduation. On joining the U.N.T.D., a student becomes a member of the Royal Canadian Navy (Reserve).

Training

The U.N.T.D. course is of three years duration, each year of which is governed by a different syllabus. First year students are entered in the U.N.T.D. as Probationary Cadets and are promoted to Officer Cadet on passing

a selection board during the first year of the course. Sixty-four hours of training during each of the three academic years, and two summer training periods of at least 14 weeks' duration each are required in order to qualify for a commission. Summer training takes place at the east and west coasts and afloat in training ships.

Depending on what degree course a student is registered in, he would become an Officer Cadet in one of the following branches of the naval service: Execuitve, Engineering, Electrical, Ordnance, Constructor, Instructor, Medical, Supply or Medical Technical Branch.

Pay

U.N.T.D. Officer Cadets are paid $210 per month, all found, for all summer training and up to 16 days' pay for winter training. Uniforms are supplied, as is transportation and medical care during the summer.

COMMISSIONS IN THE ROYAL CANADIAN NAVY

Freshmen starting University may apply for the R.C.N. Regular Force and Officer Cadets may transfer from the U.N.T.D. to the R.C.N. Regular Force and train for a permanent commission. Application can be made at any time during their University training, subject to the following conditions:

(a) Under 21 years of age on the first of January of the year of entry to University.

(b) Have reached an academic standing of Senior Matriculation or its equivalent.

(c) Have successfully completed University coruses and U.N.T.D. training to date of application (the latter being applicable only in transfer from the U.N.T.D.).

(d) Are taking courses required for the branch for which application is made. (Two years of mathematics through differential and integral calculus; and two years of physics is required.)

Terms of Service

(a) Free tuition, books, instruments, uniforms.

(b) Free rations and quarters, or allowance in lieu. Medical and dental care.

(c) Obligation to remain in good standing academically, to carry out naval training successfully and to show promise of developing into a satisfactory officer.

(d) Obligation to serve in the Regular Force for at least three years after leaving University.

For further information, consult the Staff Officer, HMCS Nonsuch or Armed Forces Liaison Officer, University Drill Hall.

XXII

General Organization of the University

GOVERNING BODY OF THE UNIVERSITY OF ALBERTA

VISITOR

THE HONORABLE JOHN PERCY PAGE, B.A., B.C.S., Lieutenant-Governor of Alberta.

The Lieutenant-Governor of the Province, as representative of Her Majesty the Queen in right of the Province, is *ex officio* the Visitor of the University.

CHANCELLOR

HIS HONOUR JUDGE LAURANCE YEOMANS CAIRNS, B.A., LL.D.

The Chancellor is elected for a term of six years by the members of Convocation. He is the chairman of Convocation and of the Senate, confers all degrees, and is *ex officio* a member of the Board of Governors.

PRESIDENT

WALTER HUGH JOHNS, B.A., Ph.D., LL.D.

The President is the chief executive officer of the University. He is appointed by the Lieutenant-Governor in Council. He is *ex officio* a member of the Board of Governors, of the Senate, and of all Faculty Councils. He presides in General Faculty Council and in other Faculty Councils when he is present. He is entrusted with the general supervision of the academic work of the University and of the teaching staff and of the administrative staff concerned with academic work. He makes recommendations to the Board of Governors in respect of all appointments to the teaching staff and to the administrative staff of the University concerned with academic work and in respect of all promotions and removals of such members of the staff.

THE BOARD OF GOVERNORS

CHARLES MALCOLM MACLEOD, Q.C., LL.B., LL.D., Chairman.
HIS HONOUR JUDGE LAURANCE YEOMANS CAIRNS, B.A., LL.D., Chancellor of the University.
WALTER HUGH JOHNS, B.A., Ph.D., LL.D., President.
FREDERICK GAVIN STEWART, Esq., Deputy Provincial Treasuer.
WILLIAM HERBERT SWIFT, B.A., M.A., B.Ed., Ph.D., Deputy Minister of Education.
SAMUEL ROBERT ROGERS, B.Sc., President of the Alumni Association.
HAUGHTON THOMSON, B.Com., Vice-President of the Alumni Association.
MRS. W. C. TAYLOR.
THE HONORABLE MR. JUSTICE HUGH JOHN MACDONALD.
NATHAN ELDON TANNER, Esq.
ARNOLD WILLIAM PLATT, B.Sc., M.Sc., F.A.I.C.
MERRILL DAVIS MUTTART, Esq.
JOHN WRIGHT PROCTOR, Esq.
JOHN MACLEAN WHIDDEN, B.Com., Bursar, Secretary of the Board.

The Board of Governors is a body corporate under the name and style of "The Governors of the University of Alberta". The board consists of the Chancellor, the President of the University, the President and Vice-President of the Alumni Association, the Deputy Provincial Treasurer, the Deputy

Minister of Education, and the chairman and six other persons appointed by the Lieutenant-Governor in Council.

The conduct, management, and control of the University and all its property, revenue, business, and affairs are vested in the Board. The Board appoints the deans of all faculties, all members of the teaching staff, the Librarian, the Bursar, the Registrar, and all members of the administrative staff, but no dean of any faculty nor any member of the teaching staff of the University may be appointed unless first nominated by the President of the University. The board provides for the maintenance of buildings and the erection of new buildings. It has authority to purchase and acquire such property as it may deem necessary for the purposes of the University. It fixes the various fees charged in connection with university courses and it makes financial provision for the establishment of new faculties, departments, and courses.

All residuary powers, which by the terms of the University Act are not specifically granted to any other person or body of persons, are vested in the Board of Governors. The Board makes an annual report to the Lieutenant-Governor in Council. This report is transmitted to the Legislative Assembly of the Province by the Minister of Education.

THE SENATE

Statutory Members

HIS HONOUR JUDGE LAURANCE YEOMANS CAIRNS, B.A., LL.D., Chancellor of the University.

WALTER HUGH JOHNS, B.A., Ph.D., LL.D., President.

CHARLES MALCOLM MACLEOD, Q.C., LL.B., LL.D., Chairman of the Board of Governors.

....., representative of the Dean's Council, to retire June 1, 1963.

EDMUND JABEZ THOMPSON, M.A., B.D., Ph.D., D.D., Principal of St. Stephen's College.

BROTHER ALOYSIUS, M.A., Rector of St. Joseph's College.

The Rector of St. Aidan's College.

TIMOTHY CLARKE BYRNE, M.A., Ed.D., Chief Superintendent of Schools.

ERNEST WILLIAM WOOD, M.E.I.C., M.I.Mar.E., Principal, Provincial Institute of Technology and Art.

REVEREND WILLIAM JOHN COLLETT, B.A., B.Ed., B.D., M.A., Principal, Mount Royal Junior College.

SAMUEL ROBERT ROGERS, B.Sc., President of the Alumni Association.

HAUGHTON THOMSON, B.Com., Vice-President of the Alumni Association.

HAROLD STEWART BAKER, B.A., M.A., Ph.D., L.A.B., representative of the General Faculty Council, to retire June 1, 1963.

HAROLD JOHNSTON BRODIE, M.Sc., Ph.D., representative of the General Faculty Council, to retire June 1, 1963.

DARROCH DUNCAN CAMPBELL, B.Com., B.A., Director of Extension.

ALEXANDER FREDERICK McCALLA, President of the Students' Union.

Appointed Members to Retire November 1, 1960

J. ANGUS KcKINNON, Calgary, and

MAURICE EARL HARTNETT, B.S.A., representing Agriculture.

ARTHUR J. BALFOUR, Grande Prairie, representing Business.

ROBERT SCOTT, Calgary, representing Labor.

GEORGE RICHARD AGAR RICE, Edmonton, representing Industry.

MARY ROBERTA CRAWFORD, M.A., Edmonton.

MRS. CATHERINE ANDREWS, Lethbridge and

ROBERT WARREN, B.A., M.Ed., Calgary, representing Public Education.

WILLIAM B. PARSONS, B.A., M.D., Red Deer, representing Organizations devoted to Social and Cultural Welfare.

ALEXANDER DUNCAN CAIRNS, B.A., Registrar of the University, Secretary of the Senate.

The Senate of the University consists of the Chancellor, the President, the Chairman of the Board of Governors, the Principal of St. Stephen's College, the Rector of St. Joseph's College, the Rector of St. Aidan's College, the Supervisor of Schools, the Principal of the Provincial Institute of Technology and Art, the Principal of Mount Royal Junior College, the President and Vice-President of the Alumni Association, a representative of the Dean's Council, two representatives of the General Faculty Council, the Director of the Department of Extension, the President of the Students' Union, and nine members selected by the foregoing to represent agriculture, business, labour, industry, public education, and organizations devoted to social and cultural welfare.

Under the University Act of 1942, more emphasis is placed upon the function of the Senate as a bridge between the University and the life and activities of the Province, and less upon academic duties. It is empowered to inquire into all matters that might tend to enhance the unsefulness of the University. It is still responsible for recommending to Convocation the conferring of honorary degrees, this being a matter of public interest, but degrees in course are now recommended by the General Faculty Council. The Senate also continues to legislate with respect to student government, but the day-to-day administration of discipline rests with the Deans' Council.

CONVOCATION

Convocation consists (a) of the surviving members of the original group of 346 who registered under the original University Act of 1906, together with all such persons who have been admitted *ad eundem gradum* in the University of Alberta and have become duly registered; and (b) of all graduates of the University of Alberta.

Convocation elects the Chancellor and is authorized, if fifteen of its members by writing demand a meeting, to require the Chancellor to convoke the same, but such a meeting must be for a specific subject duly set forth in a letter of demand and no other subject may be discussed at the meeting.

The Chancellor is the chairman of Convocation.

GENERAL FACULTY COUNCIL

President Johns

Vice-President Cragg

Deans—Bentley, Bowker, Coutts, Govier, Harries, Huston, McCalla, MacKenzie, MacLean, Smith

Professors—Amies, Anderson, Baker, A. G. Ball, Bentley, Bhatia, Blackley, Blench, Brodie, Brown, Buxton, J. D. Campbell, Castaldi, Clandinin, Clegg, Collier, Cook, Cormack, Corns, Doucette, Dunlop, Eaton, Finn, Folinsbee, Ford, Fowler, Fraser, Gads, Gain, Garland, Gilles, Glyde, Goodwin, Grayson-Smith, Greene, Greenhill, Gunning, Hanson, W. G. Hardy, Harle, Henry, Hocking, Hodgson, Johnson, Jones, Keeping, Kreisel, Lilge, R. S. McArthur, McDougall, McElroy, J. W. Macgregor, MacHardy, McIntyre, McMurchy, Mardiros, Martin,

Marshall, Moser, Mowat, Myers, Nash, Newbound, Parr, Patching, Pearce, Porteous, Rawlinson, Reeves, Riedel, Robblee, Robinson, Salt, Salter, Sandin, Scargill, D. B. Scott, Shaner, Sinclair, A. Smith, W. D. Smith, Sparby, Stelck, Stirrat, Stuart, Thomas, Thompson, Toogood, Tuba, Unrau, Vant, Van Vliet, B. E. Walker, Weijer, Whyte, Wilson, Wonders, Wyman, Youne

Miss McClure, *Director of the School of Nursing*

A. A. Ryan, *Provost and Secretary of the Deans' Council*

D. D. Campbell, *Director of Extension*

B. B. Peel, *Librarian*

A. D. Cairns, *Registrar, Secretary of the Council*

Faculty Councils

The General Faculty Council consists of the President, the Deans, the full Professors in all the faculties, the Director of the Department of Extension, the Librarian, and the Registrar. The General Faculty Council, subject to the authority of the Board of Governors, is the senior academic body of the University. It arranges timetables, approves courses and examination results, recommends degrees, and hears appeals by students and others from decisions of Faculty Councils.

Each faculty of the University has a Council consisting of the President, the Dean of the Faculty, the professors and associate professors, such other members of the teaching staff of the faculty as the Board of Governors may determine, and a representative of each of the appropriate professional societies associated with the University. Each Faculty Council, subject to the authority of the General Faculty Council, arranges the courses of study falling within its jurisdiction; it arranges for the setting of examinations and for making examination returns to the General Faculty Council. It deals with petitions and memorials from students registered in the Faculty. The membership of these Councils and of the Councils of the Schools of Household Economics, Nursing, Physical Education and Physical Therapy and Occupational Therapy, is set out below.

Arts and Science

President Johns

Vice-President Cragg

Dean Smith

Professors—Bhatia, Blackley, Brodie, Brown, J. D. Campbell, Collier, Cook, Cormack, Eaton, Empey, Folinsbee, Garland, Glyde, Grayson-Smith, Greene, Gunning, Hanson, Hardy, Jones, Keeping, Kreisel, R. S. McArthur, Macgregor, McIntyre, Mardiros, Moser, Newbound, Peace, Salter, Sandin, Scargill, D. B. Scott, Stelck, Stuart, Thomas, Walker, Whyte, Wonders, Wyman

Associate Professors—Allen, Baldwin, Ball, Bruce, Burwash, Challice, Charlesworth, Cree, Crighton, Crosby, Davis, Davy, Duggan, Eccles, Elder, Farnham, Faucher, Fostvedt, Gainer, Gibb, Godfrey, Goodale, Goundrey, Guy, Harris, Harrold, Hartland-Rowe, Heymann, Hirabayashi, Horton, Jacka, James, Kennedy, Laycock, Lerbekmo, Lorch, Lowig, Mackenzie, McNamee, Mandel, Miles, Moore, Narayana, S. J. Nelson, Nursall, Peacock, Peck, Penelhum, Phibbs, Prince, Reinhold, Rempel, von Richthofen, R. O. A. Robinson, Ryan, Samuel, Schiff, Self, Spearman, Spencer, Starchuk, J. B. Taylor, Trainor, W. J. Wallace, Watson, Whitney, B. G. Wilson, L. Wilson, Winspear, Woods

Assistant Professor—May
The Registrar

Agriculture

President Johns
Dean Bentley
Professors—A. G. Ball, Clandinin, Clegg, Collier, Corns, Henry, *Hocking, Johnson, Keeping, McElroy, MacHardy, Robblee, Salter, Toogood, Unrau, Weijer, Whyte
Associate Professors—Andrew, G. E. Ball, Berg, Bowland, Harris, Knowles, Mackenzie, W. E. Smith, Stephanson, Zalik
Assistant Professors—Mackie, Robertson, Wood
Dr. O'Donoghue
Dr. J. Gordon Anderson, *representative of the Veterinary Medical Association of Alberta*
W. E. Bowser, *representing the Alberta Institute of Agrologists*
The Registrar

Commerce

President Johns
Dean Harries
Professors—J. D. Campbell, Hanson
Associate Professors—Fostvedt, Gainer, Goodale, Thompson
Assistant Professors—Kyle, Preshing
G. E. Gee, *representative of the Institute of Chartered Accountants of Alberta*
The Registrar

Dentistry

President Johns
Dean MacLean
Dean MacKenzie
Professors—Castaldi, Fraser, J. Macgregor, McMurchy, Pearce, Salt, Stirrat, Tuba
Associate Professors—Geldart, Haryett, D. MacGregor, McPhail, D. R. Stewart, Van Alstine
Dr. E. Hitchin
Dr. B. A. Low, *representative of the Alberta Dental Association*
The Registrar

Education

President Johns
Dean Coutts
Associate Dean Doucette
Professors—Baker, Buxton, Cook, Dunlop, Eaton, Finn, Gilles, Goodwin, Hodgson, Keeping, MacArthur, McDougall, Mardiros, Mowat, Reeves, Salter, Sparby, Van Vliet, Walker
Associate Professor—Aikenhead, Anderson, Andrews, Ayers, Black, Caldwell, Card, Christensen, Dey, Dugan, Earl, Eccles, Eriksson, Forbes, Guy, Hampson, James, Kennedy, Lampard, Lindstedt, Melsness, Newton, Pilkington, Self, Smith, Stadelbauer, Storey, Woodsworth, *Worth
Assistant Professors—Affleck, Anderson, Cheal, Crawford, Dockrell, Filipkowski, Harper, Jenkinson, Lupul, Macdonald, Moore, Norris, Smith, Stewart

Dr. S. C. T. Clarke, *representative of the Alberta Teachers' Association*
The Principal of the Demonstration School
The Registrar

Engineering

President Johns
Dean Govier
Professors—Blench, Folinsbee, Ford, Gads, Grayson-Smith, Gunning, Harle, Keeping, Lilge, Parr, Patching, Porteous, D. B. Robinson, D. B. Scott, Sinclair, Wyman
Associate Professors—Bigg, Bouthillier, Dalla Lana, Davis, Dranchuk, Duby, Flock, Fowler, Kennedy, Leja, Longworth, H. R. McArthur, Panar, Peterson, Phillips, Preston, Quon, Sadler, Stilwell
H. L. Bouey, *representative of the Alberta Association of Architects*
J. C. Langford, *representative of the Association of Professional Engineers of Alberta*
J. H. Holloway, *representative of the Alberta Land Surveyors' Association*
The Registrar

Graduate Studies

President Johns
Deans—McCalla, Huston
Professors—Baker, Collier, Dunlop, Grayson-Smith, Greene, Gunning, Hanson, *Hocking, McElroy, Parr, Pearce, Reeves, Robinson, Salter, Sinclair, Stelck, Thomas, Toogood, Unrau, Wyman
Associate Professor—Gilbert
The Registrar

Household Economics

President Johns
Dean Smith
Professor Empey, Director
Professor—Sandin
Associate Professors—Duggan, Spencer
The Registrar

Law

President Johns
Dean Bowker
Honorary Professors—Cairns, Ford, Steer, Martland
Professor—A. Smith
Associate Professors—Thompson, Sherbanuik
Assistant Professor—Angus
E. W. S. Kane, Q.C., *representative of the Law Society of Alberta*
The Registrar

Medicine

President Johns
Dean MacKenzie
Deans—MacLean, Huston
Assistant Dean—Thompson
Professors—W. S. Anderson, *Collier, Duggan, Fowler, Gain, Greenhill, Macgregor, Martin, Myers, Nash, Pearce, Rawlinson, Salt, Stirrat, Stuart, Tuba, Vant, Wilson, Yonge

Associate Professors—Bain, Boyd, Carmichael, Fraser, Couves, Duggan, Forster, Fraser, Gilbert, Harrison, Heath, Hohn, Kowalewski, Macbeth, McClure, Monckton, Nelson, Penikett, Smillie, Spencer, Sprague, Stewart, Taylor

Dr. W. Bramley-Moore, *representative of the College of Physicians and Surgeons of Alberta*

The Registrar

Nursing

President Johns

Miss McClure, Director

Deans—MacKenzie, Smith

Professors—Marshall, Vant

Assistant Professors—Cogswell, McMillan

The representative of the Alberta Association of Registered Nurses

Representatives of the School of Nursing, Calgary General Hospital: Miss G. Hall, Director of Nursing, Honorary Lecturer; Miss D. M. Dick, Associate Director of Nursing Education

Representatives of the School of Nursing, University of Alberta Hospital: Miss J. S. Clark, Director of Nursing, Honorary Lecturer; Miss M. R. Thompson, Associate Director of Nursing Education

The Registrar

Pharmacy

President Johns

Dean Huston

Dean MacKenzie

Professors—Brodie, *Collier, Riedel, Sandin, Stirrat

Associate Professor—Anderson

Assistant Professors—Morrison, Palmer

W. H. Sprague, *representative of the Albrta Pharmaceutical Association*

The Registrar

Physical Education

President Johns

Professor Van Vliet, Director

Deans—Bentley, Coutts

Professors—Goodwin, Hardy, Porteous, W. D. Smith, Wilson

Associate Professors—Eriksson, Austin, McLachlin

Assistant Professors—Affleck, R. O. Anderson, Carson, Drake, Macintosh, Mendryk, M. F. R. Smith

The Registrar

Physical Therapy and Occupational Therapy

President Johns

Dean MacKenzie

Professor, J. R. Fowler, Director

Professors—Grayson-Smith, Macgregor, J. S. Thompson, Vant, Wilson

Associate Professors—Baldwin, Heath, Nursall, Wilson

Assistant Professors—Rendell, Fish

Dr. M. Carpendale

Dr. G. L. Wilson

Dr. R. J. Johnston
The Registrar

THE DEANS' COUNCIL

The Deans' Council, consisting of the President and the Deans of all the Faculties, has advisory, executive, and disciplinary functions.

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

President of the University—Walter Hugh Johns, B.A., Ph.D., LL.D.
Vice-President—Laurence Harold Cragg, M.A., Ph.D., F.C.I.C.
Provost and Executive Assistant to the President—Aylmer Arthur Ryan, B.A., M.A.
Assistant to the President—Aylmer Arthur Ryan, B.A., M.A.
Dean of the Faculty of Arts and Science—Douglas Elstow Smith, M.A., Ph.D.
Dean of the Faculty of Law—Wilbur Fee Bowker, Q.C., B.A., LL.B., LL.M.
Dean of the Faculty of Engineering—George Wheeler Govier, B.A.Sc., M.Sc., Sc.D.
Dean of the Faculty of Medicine—Walter Campbell MacKenzie, B.Sc., M.D., C.M., M.S., F.A.C.S., F.R.C.S.(C.).
Dean of the Faculty of Agriculture—Charles Fred Bentley, M.Sc., Ph.D.
Dean of the Faculty of Education—Herbert Thomas Coutts, B.A., M.A., Ph.D.
Dean of the Faculty of Dentistry—Hector Robert MacLean, D.D.C., F.A.C.D., F.I.C.D.
Dean of the Faculty of Pharmacy—Mervyn James Huston, M.Sc., Ph.D.
Dean of the Faculty of Graduate Studies—Arthur Gilbert McCalla, B.Sc., M.Sc., Ph.D., F.R.S.C.
Dean of the Faculty of Commerce—Hubert William Harries, B.Sc., M.Sc., M.A., Ph.D.
Director of the School of Nursing—Ruth Elizabeth McClure, B.Sc., M.P.H., R.N.
Director of the School of Household Economics—Elizabeth L. Empey, B.Sc., M.N.S., Ph.D.
Director of the School of Physical Education—Maurice Lewis Van Vliet, B.S., M.S., Ed.D.
Director of the School of Physical Therapy and Occupational Therapy—John Richard Fowler, M.D.
Director of the Banff School of Fine Arts—Donald Cameron, M.Sc., LL.D.
Assistant Director, Banff School of Fine Arts—John Christian Kenneth Madsen, B.Com.
Director of Extension—Darroch Duncan Campbell, B.Com., B.A.
Associate Dean, Faculty of Education, Calgary—Andrew Leo Doucette, B.Sc., M.A., Ed.D.
Administrative Officer, Arts and Science, Calgary—Earl Frederick Guy, M.A., Ph.D.
Director of the Summer Session and of the Evening Credit Program—John William Gilles, M.A., M.Ed., Ed.D.
Director of Student Counselling Services—Alexander Joseph Cook, B.Sc., M.A., Ph.D.
Counselling Services, Calgary—Helen Isobel McWilliam, B.A.
Provost, Calgary—Allan Alexander Gibb, B.Sc., B.Ed., M.A., Ed.D.
Dean of Women—Mrs. J. Grant Sparling, B.A., Dip.S.W.
Librarian to the University—Bruce Braden Peel, M.A., B.L.S.
Superintendent of the University Hospital—Angus Cecil McGugan, M.D., D.P.H.
Registrar of the University—Alexander Duncan Cairns, B.A.
Associate Registrar and Assistant to the Principal, Calgary—Harold Richard Hawes, B.Sc.
Assistant Registrar—Lynn Parkes Morgan, B.A.
Alumni Secretary—Alexander Gilmour Markle, B.A., B.J.
Bursar of the University—John MacLean Whidden, B.Com.
Accountant—Murray Alexander Rousell, B.Com., C.A.
Purchasing Agent—Edward Frederick Hunter, B.Com.
Assistant Accountant—Albert Stephen Knowler, B.Com.
Warden of Athabasca Hall—
Warden of Assiniboia Hall—
Personnel Officer—Murray Stewart Cooke, B.S.A.
Superintendent of Buildings—Beverly Whitmore Brooker, B.Sc.
Administrator of Student Awards—Robert Barry Wishart, B.Com.
Advisor to Men Students—Roland Charles Wilkins Hooper, Major.

ACADEMIC STAFF

(The first of the dates in each case is that of first appointment, and the second that of attaining the present rank.)

AARON, T. H., B.Sc., M.D. (Alberta); Instructor in Medicine (1952, 1957).

ADAM, F. C., B.A., M.Sc. (UBC), Ph.D. (Washington); Assistant Professor of Chemistry, Calgary (1958, 1958).

ADAM, I., B.A. (Alberta), M.A. (London); Assistant Professor of English, Calgary (1960, 1960).

AFFLECK, A. F., B.P.H.E. (Toronto), B.Ed. (Alberta); Assistant Professor of Physical Education (1951, 1955).

AIKENHEAD, J. D., B.Sc. (Manitoba), A. M. (Chicago), Ed.D. (Oregon); Associate Professor of Education, Calgary (1950, 1954).

ALEXANDER, J. F., B.S., M.A. (Notre Dame); Assistant Professor of Physical Education (1960, 1960).

ALLARD, C. A., M.D. (Alberta), F.R.C.S.(C), F.A.C.S.; Lecturer in Surgery (1951, 1958).

ALLBON, L. C., Teach. Dip., A.O.T. (England); Lecturer in Occupational Therapy (1960, 1960)

ALLEN, W.F., B.Sc. (Western Ontario), M.A., Ph.D. (Toronto); Associate Professor of Chemistry, Calgary (1958, 1954).

ALLIN, E. S., B.Sc. (Alberta), M.D. (Toronto), F.R.C.S. (London), F.R.C.S.(C); Instructor in Surgery (1941, 1947).

ALTMANN, S. A., M.A. (California); Assistant Professor of Zoology (1960, 1960).

ALTON, J. D. M., M.Sc., M.D. (Alberta); Sessional Instructor in Surgery (1959, 1959).

ANDERSON, A. J., B.Sc. in Pharm. (Alberta), M.S. (Washington); Associate Professor of Pharmacy (1949, 1957).

ANDERSON, C. C., M.A., Ed.B. (Glasgow), Ph.D. (Cantab.); Associate Professor of Education (1957, 1957).

ANDERSON, K. O., B.Sc. (Alberta); Assistant Professor of Civil Engineering (1957, 1957).

ANDERSON, R. N., B.A., B.Ed. (Saskatchewan), M.A. (Minnesota); Assistant Professor of Secondary Education, Calgary (1959, 1959).

ANDERSON, Ruby O., B.Ed. (Alberta); Assistant Professor of Physical Education (1956, 1956).

ANDERSON, W., B.A., LL.B. (Saskatchewan); Sessional Instructor in Law (1960, 1960).

ANDERSON, W. S., B.Sc. (Alberta), M.S., M.D. (Toronto), F.R.C.S(C), F.A.C.S.; Professor of Surgery (1941, 1956).

ANDREW, W. T. (B.Sc. (Alberta), M.S. (Utah State Agric. Coll.), Ph.D. (Michigan State); Associate Professor of Plant Science (1959, 1959).

ANDREWS, J. H., M.A. (UBC), Ph.D. (Chicago); Associate Professor of Educational Administration (1957, 1957).

ANGHELIS, B., Ph.D. (Athens); Teaching Fellow in Paediatrics (1960, 1960).

ANGUS, W. H., B.A., LL.B. (Toronto), LL.M. (Columbia); Assistant Professor of Law (1959, 1959).

ANSLEY, R. W., B.A., B.Sc. (Queen's), M.Sc. (Alberta); Assistant Professor of Civil Engineering (1959, 1959).

ANTON, F. R., B.Sc. (London), M.A. (U.C.L.A.); Assistant Professor of Political Economy (1957, 1957).

ARCHIBALD, W. S., B.A. (Alberta), M.D., C.M. (McGill); Sessional Instructor in Clinical Surgery (1941, 1959).

ARNOLD, A. H., L.-ès-L., Ph.D. (Fribourg); Assistant Professor of Modern Languages (1959, 1959).

ARMSTRONG, D. A., B.Sc., Ph.D. (McGill); Assistant Professor of Chemistry, Calgary (1958, 1958).

ARMSTRONG, H. B., M.D. (Alberta); Assistant Clinical Professor of Paediatrics (1950, 1959).

ARMSTRONG, W. S. S., M.D., C.M. (McGill); Assistant Clinical Professor of Otolaryngology (1931, 1957).

AUSTIN, Patricia, L., B.P.H.E. (Toronto), M.A. (Columbia); Associate Professor of Physical Education (1947, 1955).

AYER, W. A., B.Sc., Ph.D. (New Brunswick); Assistant Professor of Chemistry (1958, 1958).

AZIZ, K., Inter-science degree (general science) (Karachi), B.Sc. (Alberta), B.Sc. Mech. Eng. (Michigan); Sessional Lecturer in Petroleum Engineering (1960, 1960).

BAADSGAARD, H., B.S. (Minnesota), Ph. D. (Federal Institute, Zurich); Assistant Professor of Geology (1957, 1957).

BAIN, G. O., B.Sc., M.D. (Alberta); Associate Professor of Pathology (1952, 1959).

BAIRD, D., B.A. (UBC), M.S. (Columbia); Chief Cataloguer, Library (1957, 1957).

BAIRD, R. E., M.A. (Augusta), M.A. (Illinois); Assistant Professor of Political Science (1960, 1960).

BAKER, H. S., B.A. (Toronto), M.A. (Alberta), Ph.D. (Columbia); L.A.B. (Royal Schools); Professor of Education (1947, 1955).

BAKKER, J. J., B.Sc. (Glasgow), D.I.C. (London), M.S.C.E. (Purdue); Assistant Professor of Civil Engineering (1959, 1959).

BALA, R. M., M.D. (Alberta); Sessional Instructor in Medicine (1959, 1959).

BALDWIN, R. G., B.A. (UBC), M.A., Ph.D. (Toronto); Associate Professor of English (1951, 1958).

BALL, A. G., B.S.A. (Toronto), M.S., Ph.D. (Iowa State); Professor of Farm Management (1960, 1960).

BALL, G. E., A.B., Ph.D. (Cornell), M.S. (Alabama); Associate Professor of Entomology (1954, 1959).

BANCROFT, D. A., B.Sc. (Alberta); Extension Lecturer (Municipal Administration) (1958, 1958).

BARON, M. J., B.Sc. (Alberta), M.S. (U. of Illinois); Assistant Professor of Civil Engineering (1959, 1959).

BASARABA, N., D.D.S. (Alberta); Lecturer in Dentistry (Pedodontics) (1958, 1958.)

BAUER, M. F., B.A. (Western Ontario), M.A. (Toronto); Assistant Professor, Political Economy (1956, 1956).

BEATON, Mary A., B.Sc., M.Ed. (Alberta); Assistant Professor of Education, Calgary (1959, 1959).

BEAUCHAMP, L. E., B.Sc., M.D. (Alberta); Lecturer in Paediatrics (1951, 1955).

BELL, D. Munns, M.D. (Alberta), F.R.C.S.(C); Lecturer in Obstetrics and Gynaecology (1951, 1955).

BELL, D. MacPherson, B.A., M.D. (Alberta); Lecturer in Medicine (1953, 1958).

BELL, G. I., B.A., M.D. (Alberta), F.A.C.P.; Lecturer in Clinical Medicine (1945, 1950).

BELL, H. E., B.Sc., M.D. (Alberta); Instructor in Pathology (1957, 1957).

BELL, R. E., m.i.d., M.D. (Alberta); Assistant Professor of Pathology (1950, 1954), and Honorary Lecturer in Medicine (1958).

BENTLEY, C. F., M.Sc. (Alberta), Ph.D. (Minnesota); Dean of Agriculture (1946, 1959).

BERG, R. T., B.Sc. (Alberta), M.S., Ph.D. (Minnesota); Associate Professor of Animal Husbandry (1950, 1957).

BERGLUND, R. C., B.Com. (Alberta); Sessional Instructor in Accounting, Calgary (1958, 1958).

BERGMAN, J. F., A.B., Ph.D. (California), M.A. (Texas); Assistant Professor of Geography (1960, 1960).

BESNEY, M., B.Sc., M.D. (Alberta); Instructor in Surgery (1958, 1959).

BESSAI, F., M.A. (Saskatchewan); Assistant Professor of English (1960, 1960).

BEST, Barbara J., B.Sc. (Carleton College); Sessional Instructor in Clinical Pathology (1956, 1956).

BETTS, D. D., M.Sc. (Dalhousie), Ph.D. (McGill); Assistant Professor of Physics (1956, 1956).

BHATIA, A. B., M.Sc., D.Phil. (Allahabad), Ph.D. (Liverpool); Professor of Physics (1955, 1960).

BIGG, W. L., B.Sc. (Alberta); Associate Professor of Drawing (1957, 1960).

BILSLAND, J. W., M.A. (UBC), Ph.D. (Toronto); Assistant Professor of English (1955, 1959).

BIRSS, F. W., M.A. (Saskatchewan), D.Phil. (Oxford); Assistant Professor of Chemistry (1959, 1959).

BLACK, D. B., M.Ed. (Alberta), Ed.D. (Washington); Associate Professor of Education (1957, 1957).

BLACKLEY, F. D., M.A., Ph.D. (Toronto); Professor of History (1950, 1959); also, Assistant Dean, Faculty of Arts and Science.

BLENCH, T., B.Sc. (Glasgow), D.Sc. (Alberta), M.I.C.E.; Professor of Civil Engineering (1948, 1954).

BOCIURKIW, B. R., M.A. (Manitoba), Ph.D. (Chicago); Assistant Professor of Political Economy (1956, 1956).

BOILEAU, G. R., B.Sc., M.D. (Alberta), F.R.C.S.(C); Instructor in Surgery (1952, 1954).

BOOTE, M. J., B.A. (Wales), Ph.D. (McGill); Assistant Professor of Political Economy (1959, 1959); on staff 1955-57 also.

BOUTHILLIER, P. H., B.Sc. (Alberta), S.M. (Harvard); Associate Professor of Civil Engineering (1947, 1956).

BOWKER, W. F., B.A., LL.B. (Alberta), LL.M. (Minnesota), Q.C.; Professor of Law and Dean of the Faculty of Law (1945, 1954).

BOWLAND, J. P., B.S.A. (Manitoba), M.S. (Washington), Ph.D. (Wisconsin); Associate Professor of Animal Husbandry (1949, 1954).

BOYD, J. A., B.A. (Saskatchewan), M.D. (Manitoba), F.R.C.S.(C); Lecturer in Obstetrics and Gynaecology (1954, 1959).

BOYD, T. A. S., M.B., Ch.B. (Glasgow), F.R.C.S.(Eng.); Associate Professor of Ophthalmology and Otolaryngology (1958, 1958).

BRAMLEY-MOORE, W., M.D. (Alberta); Lecturer in Clinical Medicine (1949, 1958).

BROCK, P. de B., M.A., D.Phil. (Oxford), Ph.D. (Cracow); Assistant Professor of History (1958, 1958).

BRODIE, H. J., M.Sc. (Manitoba), Ph.D. (Michigan); Professor and Head of Botany (1957, 1957).

BROOKER, B. W., B.Sc. (Alberta); Superintendent of Buildings.

BROOKER, E. W., M.Sc. (Alberta); Assistant Professor of Civil Engineering (1958, 1958).

BROWN, G. D., B.Sc., M.D. (Alberta); Instructor in Clinical Medicine (1954, 1955).

BROWN, L. B., B.Sc., M.D. (Alberta), F.R.C.P.S.(C); Clinical Tutor in Obstetrics and Gynaecology (1957, 1959).

BROWN, R. K., M.Sc. (Alberta), Ph.D. (McGill); Professor of Chemistry (1946, 1960).

BRUCE, W. J., B.Ed. (Alberta), M.Ed. (Chicago); Ph.D. (Washington); Associate Professor of Mathematics (1958, 1959).

BUCHANAN, D. I., M.B., Ch.B. (Glasgow); Lecturer in Pathology (1955, 1959).

BUCK, R. J., B.A. (Alberta), M.A. (Kentucky), Ph.D. (Cincinnati); Assistant Professor of Classics (1960, 1960).

BUCKMASTER, H. A., B.Sc. (Alberta), M.A., Ph.D. (UBC); Assistant Professor of Physics, Calgary (1957, 1957).

BUECKERT, F. F., B.Ed. (Saskatchewan), A.M. (Columbia); Assistant Professor of Drama (1955, 1959).

BUGIS, J., B.A., M.D. (Alberta); Instructor in Obstetrics and Gynaecology (1954, 1959).

BURWASH, R. A. M., B.Sc., B.Ed., M.Sc. (Alberta), Ph.D. (Minnesota); Associate Professor of Geology (1956, 1959).

BURY, R. J., M.D. (Western Ontario); Assistant Professor of Anatomy (1952, 1958).

BUXTON, E. W., B.A., B.Ed. (Alberta), M.A. (Washington), Ph.D. (Stanford); Professor of Education (1948, 1959).

CAIRNS, A. D., B.A. (Alberta); Registrar (1946, 1956).

CAIRNS, A., M.D. (Alberta); Instructor in Medicine (1952, 1955).

CAIRNS, Grace G., B.Sc. (Alberta); Instructor and Dietitian (1944, 1944).

CALDER, J., M.D. (Alberta); Clinical Professor of Paediatrics (1933, 1954).

CALDWELL, Muriel A., B.Ed. (Alberta); Associate Professor of Education (1949, 1957).

CALLAGHAN, J. C., M.S., M.D. (Toronton), F.R.C.S.(C), F.A.C.S.; Assistant Clinical Professor of Surgery (1955, 1958).

CAMERON, D., M.Sc. (Alberta), LL.D. (British Columbia); Director, Banff School of Fine Arts (1930, 1937).

CAMERON, D. F., M.B.E., m.i.d., B.A., M.D. (Alberta); Lecturer in Anaesthesia (1953, 1958), Lecturer in Physiology (1950, 1959).

CAMERON, G., M.D. (McGill); Lecturer in Surgery (1955, 1958).

CAMERON, R. B., D.D.S., L.D.S. (Toronto); Sessional Lecturer in Dentistry (1946, 1952).

CAMPBELL, D. D., B.Com., B.A. (UBC); Professor and Director of Extension (1949, 1956).

CAMPBELL, F. A., B.Sc. (Manitoba), M.A. (Queen's); Ph.D. (Princeton); Assistant Professor of Geology (1958, 1958).

CAMPBELL, J. D., M.Com. (Queen's), F.C.A., R.I.A.; Professor of Accounting (1945, 1950).

CAMPBELL, Margaret M., B.A.Sc. (UBC), M.P.H. (Michigan); R.N.; Assistant Professor of Nursing (1957, 1957).

CAMPION, Margaret, B.Sc. (Manitoba), M.Ed. (Columbia); Assistant Professor of Household Economics (1958, 1959).

CANTOR, M. M., B.Sc., M.D. (Manitoba), F.A.C.P.; Assistant Clinical Professor of Pathology (1930, 1956).

CARD, B. Y., B.Sc., B.Ed. (Alberta); Associate Professor of Education (1945, 1955).

CARMICHAEL, J. W., Ph.D. (Harvard), M.Sc. (Alberta); Associate Professor of Microbiology (1954, 1958).

CARPENDALE, M. T. F., M.R.C.S. (London), L.R.C.P. (England); Lecturer in Rehabilitation Medicine (1956, 1957).

CARSON, Audrey M., B.Ed. (Alberta); Assistant Professor of Physical Education (1958, 1959).

CARSON, G. D., M.D. (Alberta); Sessional Instructor in Psychiatry (1954, 1954).

CARRIER, Lois J., B.A. (Saskatchewan), B.L.S. (Toronto); Librarian, Boreal Institute (1953, 1960).

CASTALDI, C. R., D.D.S. (Toronto), M.S.D. (Northwestern); Professor of Dentistry (1956, 1956).

CHALLICE, C. E., B.Sc., Ph.D. (London), A.R.C.S., D.I.C., F.inst.P.; Associate Professor of Physics, Calgary (1957, 1959)

CHANAL, H. F., L.-ès-L. (Lyons); Lecturer in Russian (1958, 1958).

CHAPIN, D. F.. M.A. (Toronto); Assistant Professor of English (1959, 1959).

CHAPMAN, K. M., B.A., M.S. (Minnesota); Assistant Professor of Physiology (1958, 1958).

CHARLESWORTH, H. A. K., M.A. (Cambridge), Ph.D. (Glasgow); Associate Professor of Geology (1956, 1960).

CHEAL, J. E., L.R.S.M. (London), A.R.C.T. (Toronto), M.Ed. (Alberta); Assistant Professor of Education (1958, 1958).

CHENARD, Imelda, M.S.W. (Laval); R.N.; Assistant Professor of Psychiatry (1958, 1960).

CHORNY, M., M.Ed. (Alberta); Assistant Professor of Secondary Education (English), Calgary (1960, 1960).

CHRISTENSEN, A. H., B.Sc., M.D. (Alberta); Instructor in Pathology (1955, 1955).

CHRISTENSEN, C. M., M.A., Ph.D. (Minnesota); Associate Professor of Educational Psychology (1959, 1959).

CHURCHLEY, E. F., B.Mus. (Toronto), M.A., Ed.D. (Columbia), A.R.C.T., L.R.C.T. (Toronto); Assistant Professor of Education (Music), Calgary (1959, 1959).

CLANDININ, D. R., M.S.A. (UBC), Ph.D. (Wisconsin); Professor of Poultry Husbandry (1938, 1953).

CLARE, R. M., M.D. (Alberta); Lecturer in Radiology (1946, 1957).

CLARKE, K. A. C., M.C., B.Sc., M.D. (Alberta); Associate Professor of Oto-Laryngology (1950, 1960).

CLARKE, K. G., B.Sc. (Queen's); Assistant Professor of Electrical Engineering (1955, 1956).

CLARKE, T. R., M.D. (Alberta), M.R.C.O.G.; Assistant Clinical Professor of Obstetrics and Gynaecology (1941, 1951).

CLEGG, L. F. L., B.S.A. (Toronto), Ph.D., D.Sc. (London), D.I.C., M.I.Biol.; Professor and Head, Department of Dairy Science (1958, 1958).

COGSWELL, Margaret, O., B.A. (Alberta), R.N.; Assistant Professor of Education, Calgary (1953, 1953).

COLLIER, H. B., M.A., Ph.D (Toronto), F.R.S.C.; Professor and Head, Department of Biochemistry (1949, 1949).

COLTER, Carla K. A., B.A. (McGill); Assistant Professor of Modern Languages (1959, 1960).

COMFORT, Darlene J., R.T.; Sessional Instructor in Pathology (1958, 1959).

CONRADI, G. J., M.D. (Jena); Instructor in Paediatrics (1954, 1956).

CONROY, F. D., M.D. (Alberta); Instructor in Urologic Surgery (1946, 1946).

COOK, A. J., B.Sc. (Alberta), A. M. (Harvard), Ph.D. (Chicago); Professor and Director of Student Counselling Services (1924, 1950)

COOKE, M. S., B.S.A. (Saskatchewan); Personnel Officer (1957, 1957).

CORMACK, E. W., C.G., O.B.E., B.Sc. (Alberta); Assistant Professor, Department of Extension (1949, 1950).

CORMACK, R. G. H., M.A., Ph.D. (Toronto), F.R.S.C.; Professor of Botany (1936, 1957).

CORNS, W. G., M.Sc. (Alberta), Ph.D. (Toronto); Professor of Crop Ecology (1946, 1956).

COTTLE, Merva K., M.A. (UBC), Ph.D. (Washington); Lecturer in Physiology (1956, 1958).

COTTLE, W. H., M.A. (UBC), Ph.D. (Washington); Assistant Professor of Physiology (1956, 1956).

COUTTS, H. T., B.A. (Toronto), M.A. (Alberta), Ph.D. (Minnesota); Dean of the Faculty of Education (1946, 1955).

COUVES, C. M., B.A. (Saskatchewan), M.D. (Manitoba), F.R.C.S. (Edinburgh); F.A.C.S., F.R.C.S.(C); Associate Professor of Surgery (1958, 1960).

CRAGG, L. H., M.A., Ph.D. (Toronto), F.C.I.C.; Professor of Chemistry and Vice-President (1959, 1959).

CRAWFORD, D. H., B.Sc., M.A., Ed.B. (Glasgow); Assistant Professor of Education (1958, 1958).

CRAWFORD, R. J., M.Sc. (Alberta), Ph.D. (Illinois); Assistant Professor of Chemistry (1956, 1956).

CREE, G. C., M.A. (McGill), Ph.D. (Washington, Mo.); Associate Professor of Mathematics (1957, 1959).

CRICHTON, Erika P., M.B., Ch.B. (Glasgow); Chief Assistant and Bacteriologist, Provincial Laboratory of Public Health, Calgary (1951, 1951).

CRIGHTON, A. B., Mus. B. (Toronto); Associate Professor of Music (1949, 1957).

CROSBY, D. R., B.Sc. (Alberta), M.A., Ph.D. (Princeton), D.Phil. (Oxford); Associate Professor of Mathematics (1950, 1953).

CUMMING, G. L., M.A. (Saskatchewan), Ph.D. (Toronto); Assistant Professor of Physics (1959, 1959).

CUTTS, J. P., B.A. (Cantab.), M.A. (Reading), Ph.D. (Birmingham); Assistant Professor of English (1958, 1959).

DAFOE, C. S., M.D., C.M. (Queen's), F.R.C.S. (Edinburgh); Instructor in Clinical Surgery (1952, 1954).

DALLA LANA, I. G., B.A.Sc. (UBC), M.Sc. (Alberta), Ph.D. (Minnesota); Associate Professor of Chemical Engineering (1957, 1960).

DARWISH, D. E., B.Sc. (Alberta), Ph.D. (U.C.L.A.); Assistant Professor of Chemistry (1958, 1958).

DAVEY, P. W., M.D., C.M. (Queen's); Assistant Professor of Pathology (1952, 1958).

DAVIES, I. J., B.Sc., Ph.D. (Wales); Assistant Professor of Mathematics (1960, 1960).

DAVIS. R. G., B.Sc., M.D. (Alberta); Instructor in Surgery (1958, 1959).

DAVIS, S. G., M.Sc. (Alberta), Ph.D. (McGill); Associate Professor of Chemistry (1942, 1951); also, Secretary of the Department.

DAVY, G. R., B.A. (Western Ontario), M.A., Ph.D. (Fletcher School of Law and Diplomacy); Associate Professor of Political Economy (1951, 1956).

DAWSON, W. F., B.A. (Toronto), M.A. (Queen's), D.Phil. (Oxford); Assistant Professor of Political Economy (1958, 1959).

DAWSON, W. K., B.S.A. (Laval), M.A., Ph.D. (Queen's); Assistant Professor of Physics (1959, 1959).

DAY, F. G., B.Sc., M.D. (Alberta), M.Ch.Ortho. (Liverpool), F.R.F.P.S. (Glasgow); Instructor in Orthopedic Surgery (1952, 1954).

de MAN, J. M., Chem. Eng. (Arnhem), Ph. D. (Alberta); Assistant Professor of Dairy Science (1959, 1959).

Des CHAMPS, A., B.Sc. (Manitoba); Agricultural Secretary, Department of Extension (1958, 1958).

DEY, Jean D., B.Ed. (Alberta); Associate Professor of Education (1957, 1959).

DICK, D. A. L., M.B., Ch.B. (Edinburgh), M.R.C.P.S. (England), F.F.R.; Instructor in Radiology (1958, 1959).

DIEMERT, Helen M., B.A. (St. Joseph's), M.A. (Minnesota); Assistant Professor of Education (1959, 1959).

DIXON, A. E., B.Sc., M.D. (Alberta), M.S. (Minnesota); Lecturer in Dermatology (1958, 1958).

DOCKRELL, W. B., B.A. (Manchester), B.Ed. (Edinburgh); Assistant Professor of Education (1959, 1958).

DODD, E. M., B.A. (Dunelm), M.A. (Ohio State); Assistant Professor of Elementary Education (Art), Calgary (1960, 1960).

DODDS, Mary I., B.Com. (Alberta), M.S. (Columbia); Extension Librarian (1955, 1957).

DOIDGE, A. G., B.E., M.Sc. (Saskatchewan), Assistant Professor of Mechanical Engineering, Calgary (1960, 1960).

DONALD, E. F., M.D. (Alberta); Lecturer in Clinical Medicine (1945, 1950).

DOOLITTLE, A. D., B.S. (Ithaca College), M.M. (Indiana); Assistant Professor of Elementary Education (Music), Calgary (1960, 1960).

DORSEY, F. R. J., B.Sc., M.D. (Alberta); Instructor in Obstetrics and Gynaecology (1954, 1956).

DOUCETTE, A. L., B.Sc. (Dalhousie), M.A. (Alberta), Ed.D. (Stanford); Associate Dean of Faculty of Education, Calgary (1945, 1960).

DOWNEY, L. W., B.A. (Saskatchewan), B.A. (UBC), Ph.D. (Chicago); Associate Professor of Educational Administration (1960, 1960).

DOWNS, W. J., B.A. (Alberta), M.D., C.M. (McGill); Instructor in Clinical Medicine (1948, 1948).

DRAKE, C. J., B.P.E. (UBC), B.Ed. (Alberta); Assistant Professor of Physical Education (1958, 1960).

DRANCHUK, P. M., B.Sc. (Alberta); Associate Professor of Petroleum Engineering (1953, 1960).

DUBY, J., B.Sc. (Alberta), M.A., D.Phil. (Oxford); Associate Professor of Mechanical Engineering (1957, 1958).

DUBY, Pauline, B.A. (Alberta); Library Assistant, Cataloguing (1960, 1960).

DUNCAN, N. F., B.Sc., M.D. (Alberta); Lecturer in Paediatrics (1954, 1957).

DUGGAN, Grace L., B.Sc., B.Ed. (Alberta), M.S. (Chicago); Associate Professor of Household Economics (1931, 1953).

DUGGAN, H. E., M.D. (Alberta), F.A.C.R.; Professor of Radiology (1948, 1959).

DUGGAN, J. W., M.D. (Alberta), M.M.S. (Tulane), F.R.C.S.(C), F.A.C.S.; Associate Professor of Ophthalmology (1950, 1960).

DUKE, C. G., D.D.S. (Alberta); Lecturer in Prosthetic Dentistry (1948, 1952).

DUNFORD, H. B., M.Sc. (Alberta), Ph.D. (McGill); Assistant Professor of Chemistry (1957, 1957).

DUNLOP, G. M., B.A. (Saskatchewan), M.A. (Alberta), Ph.D. (Columbia); Professor and Chairman, Division of Educational Psychology (1945, 1950).

DUQUETTE, Shirley, A., B.Sc., in Ed. (Cincinnati); Instructor in Physical Education, Calgary (1959, 1959).

DVORKIN, J., B.A., M.D. (Alberta); Assistant Clinical Professor of Medicine (1950, 1959).

DYRENFURTH, Inge, M.Sc. (Berlin), Ph.D. (Heidelburg); Assistant Professor of Experimental Medicine (1960, 1960).

EASTWOOD, B. J., D.D.S. (Alberta); Assistant Professor of Orthodontics (1946, 1952).

EATON, R. E., Mus.B. (McGill), Professor of Music (1947, 1956).

EARL, S. A., B.A. (BYU), M.Ed. (Montana); Associate Professor and Supervisor of Student Teaching (1959, 1959).

ECCLES, Priscilla J., M.S. (Monticello), Ed.D. (Illinois); Assistant Professor of Secondary Education (Science), Calgary (1960, 1960).

ECCLES, W. J., M.A., Ph.D. (McGill); Associate Professor of History (1957, 1959).

EDWARDS, A. M., B.Sc., M.D. (Alberta), F.R.C.P.(C); Instructor in Clinical Medicine (1956, 1958).

EDWARDS, F. J., M.D. (McGill); Sessional Instructor in Psychiatry (1959, 1959).

ELDER, A. T., B.A. (Alberta), M.A., Ph.D. (Toronto); Associate Professor of English 1950, 1957).

ELLIOT, E. C., B.Sc. (Alberta), M.D. (Toronto); Lecturer in Surgery (1958, 1958).

ELLIOTT, F. G., M.D., C.M. (Queen's), F.A.C.P.; Lecturer in Clinical Medicine (1946, 1950).

ELLIOTT, J. F., B.A., M.D. (Alberta), F.R.C.P.(C), F.A.C.P.; Clinical Professor of Medicine (1946, 1953); also Director of Student Medical Services.

EMPEY, Elizabeth L., B.Sc. (Alberta), M.N.S. (Cornell), Ph.D. (Columbia); Professor and Director of the School of Household Economics (1959, 1960); on staff 1947-1955 also.

ERIKSON. L. B., B.A. (Rochester), M.A. (Oxon.), Ph.D. (Illinois); Assistant Professor of Anatomy (1960, 1960).

ERIKSSON, A. W. E., B.Sc. (Alberta), M.Sc. (Washington); Associate Professor of Physical Education (1945, 1951).

EVANS, W. G., M.S., Ph.D. (Cornell); Assistant Professor of Entomology (1958, 1959).

FAIR, D. C., B.Ed., M.A. (Alberta); Counsellor, Student Counselling Services (rank of Lecturer) (1957, 1957).

FARMER, Geraldine, M., B.Ed. (Alberta), M.A. (Minnesota); Assistant Professor of Secondary Education (1960, 1960).

FARNHAM, W. D., B.A. (Cornell Coll., Iowa), M.A. (Columbia), Ph.D. (Oregon); Associate Professor of History (1956, 1959).

FAUCHER, M., L.en Droit (Paris), M.A. (California); Associate Professor of Modern Languages (French) (1947, 1954).

FAULDS, A. G., M.C.S.P. (London), Teacher's Certificate (CSP); Assistant Professor of Physiotherapy (1958, 1960).

FEE, A. D., D.D.S. (Alberta); Assistant Professor of Prosthetic Dentistry (1946, 1956).

FENTON, Y., B.A. (Durham), A.L.A.; Library Assistant, Cataloguing (1953, 1959).

FERGUSON, W. F., M.D. (Alberta); Assistant Professor of Obstetrics and Gynaecology (1959, 1959).

FILIPKOWSKI, Elizabeth H., B.Ed. (Alberta); Assistant Professor of Elementary Education (1957, 1960).

FINN, T. G., B.A. (Alberta), A.M., Ed.D. (Stanford); Professor of Elementary Education, Calgary; also, Secretary of the Faculty (1946, 1959).

FISH, Margaret T., M.Sc., M.D. (Alberta); Associate Professor of Anatomy (1956, 1960).

FLOCK, D. L., M.S. (Oklahoma), Ph.D. (A & M Coll., Texas); Associate Professor of Petroleum Engineering (1957 1957).

FLORENCE, D. E., D.D.S., L.D.S. (Toronto); Lecturer in the History of Dentistry and Oral Anatomy (1946, 1956).

FOKKINGA, Y. J., Ir. (Delft); Assistant Professor of Electrical Engineering (1959, 1959).

FOLINSBEE, R. E., B.Sc. (Alberta), M.A., Ph.D. (Minnesota), F.R.S.C.; Professor and Head, Department of Geology (1946, 1955).

FORBES, J. A., M.Ed. (Alberta); Associate Professor of Elementary Education (1949, 1958).

FORD, G., M.Sc. (Alberta), Ph.D. (Stanford); Professor and Head, Department of Mechanical Engineering (1942, 1957).

FORREST, J. F., M.A., B.Litt. (Glasgow), A.M. (Cornell); Assistant Professor of English (1960, 1960).

FORSTER, W., M.B., B.S. (Durham), D.P.M. (London); Associate Professor of Psychiatry (1958, 1960).

FOSTVEDT, T., B.Sc. (Alberta), M.S. (Chicago); Associate Professor of Mathematics (1945, 1955).

FOWLER, E. L., M.Sc. (Alberta); Associate Professor of Civil Engineering (1960, 1960).

FOWLER, J. R., M.D. (Alberta); Professor of Physical Medicine and Director of the School of Physical Therapy and Occupational Therapy (1954, 1957) .

FOWLIE, L., B.A. (Queen's); Assistant Librarian, Extension Library (1960, 1960).

FRACAS, G., B.Ed. (Alberta); Assistant Professor of Physical Education (1960, 1960).

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McCLEARY, Mary I. P., B.Ed. in Phys. Ed. (Alberta); Instructor in Physical Education, Calgary (1960, 1960).

McCLELLAND, R. C., D.D.S. (Alberta); Lecturer in Prosthetic Dentistry (1952, 1954).

McCLURE, Ruth E., B.Sc. (Alberta), M.P.H. (Pittsburgh), R.N. (School of Nursing, University of Alberta Hospital); Associate Professor and Director of School of Nursing (1956, 1956).

McCORMACK, C. W., M.D., C.M. (McGill), D.P.H. (Toronto); Instructor in Clinical Medicine (1954, 1956).

MacDONALD, Emma, B.A. (UBC), B.L.S. (Toronto); Applied Science Librarian (1949, 1949).

MACDONALD, G. R., B.Sc., M.D. (Alberta),F.C.A.U.; Assistant Professor of Pathology (1951, 1958).

MacDONALD, J., M.A. (Edinburgh), Ed.B., Ph.D. (Glasgow); Assistant Professor of Educational Psychology (1958, 1958).

MacDOUGALL, D. H., D.D.S. (Toronto); Lecturer in Operative Dentistry (1958, 1958).

McDOUGALL, W. D., M.A. (Alberta), Ed.D. (Columbia); Professor and Head, Division of Elementary Education (1945, 1955).

McELROY, L. W., M.Sc. (Alberta), Ph.D. (California); Professor and Head, Department of Animal Science (1943, 1951).

MacGREGOR, D. G., D.D.S. (Alberta); Associate Professor of Oral Diagnosis (1953, 1953).

MacGREGOR, J. G., B.Sc. (Alberta), M.Sc. (Illinois); Assistant Professor of Civil Engineering (1960, 1960).

McGREGOR, J. R., B.Sc., M.Ed. (Alberta), Ph.D. (Cantab.); Assistant Professor of Mathematics (1959, 1959).

MacGREGOR, J. W., B.A., M.D. (Alberta), L.M.C.C., F.R.C.P.(C); Head of the Department of Pathology, and Provincial Pathologist (1932, 1951).

MacHARDY, F. V., B.E. (Saskatchewan), M.S. (Northwestern); Professor of Agricultural Engineering (1952, 1958).

MACINTOSH, D. de F., B.Ed. in Phys. Ed. (Alberta); Assistant Professor of Physical Education, Calgary (1958, 1959).

MacKAY, V. G., M.Sc. (McGill); Special Lecturer in Animal Science (1959, 1959).

MacKENZIE, B. M., D.D.S. (Alberta); Sessional Lecturer in Pedodontics (1951, 1959).

MacKENZIE, Margery W., B.A., B.Ed. (Alberta), A.M. (Stanford); Assistant Professor. of Classics (1947, 1952).

MacKENZIE, W. C., B.Sc., M.D., C.M. (Dalhousie). M.S. (Minnesota), F.A.C.S., F.R.C.S.(C); Professor of Surgery, and Dean of the Faculty of Medicine (1939, 1959)

MacKENZIE, W., B.Sc. (Glasgow), B.Litt. (Oxon.), M.S. (Cornell); Associate Professor of Agricultural Economics (1951, 1955).

MACLACHLAN, G. A., M.A. (Saskatchewan), Ph.D. (Manitoba); Assistant Professor of Botany (1959, 1959).

McLACHLIN, H. J., B.Sc. in Phys. Ed. (McGill); M.S. (Washington); Associate Professor of Physical Education (1948, 1956).

MacLEAN, H. R., D.D.S. (Alberta), F.A.C.D., F.I.C.D.; Professor of Operative Dentistry, and Dean of the Faculty of Dentistry (1936, 1958).

MACLEAN, W. A., M.D. (Manitoba), F.R.C.S.(C); Instructor in Surgery (1958, 1959).

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McMASTER, R. D., M.A. (Toronto), Assistant Professor of English (1958, 1959).

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McNEAL, R. H., A.B. (Yale), M.A., Certificate of the Russian Institute, Ph.D. (Columbia); Assistant Professor of History (1958, 1958).

McNEILL, Patricia, J., B.A. (Alberta), B.L.S. (Toronto); Library Assistant (1959, 1959).

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MacPHERSON, A. D., D.S.O., M.D. (Alberta); Assistant Clinical Professor of Psychiatry (1947, 1955).

McTAGGART, A. N., B.A. (UBC), M.D. (McGill); Lecturer in Psychiatry (1960, 1960).

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NARAYANA, T. V., M.A. (Madras and Bombay), Ph.D. (North Carolina); Associate Professor of Mathematics (1958, 1958).

NASH, C. W., B.Sc. (Manitoba), M.Sc., Ph.D. (Minnesota); Professor of Pharmacology (1954, 1957).

NAY, M. A., M.Sc., B.Ed. (Alberta); Assistant Professor of Secondary Education (1960, 1960).

NEILSON, G. C., M.A., Ph.D. (UBC); Assistant Professor of Physics (1959, 1959).

NELSON, Esther, Assistant Professor of Drama, Department of Extension (1949, 1954).

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NELSON, J. G., B.A. (McMaster), M.A. (Colorado), Ph.D. (Johns Hopkins); Assistant Professor of Geography, Calgary (1960, 1960).

NELSON, L. D., M.Ed. (Alberta); Associate Progessor of Education (1959, 1959).

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NIX, N. W., M.Sc., M.D. (Alberta), F.A.C.A.; Instructor in Anaesthesia (1955, 1956).

NOBLE, C. E., B.A., B.Sc. (Alberta); Director of Industrial Laboratories, and Provincial Analyst (1935, 1953).

NODEN, D., M.A. (Cantab.), B.L.S. (McGill); Law Librarian (1952, 1956).

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PANAR, D., M.Sc. (Michigan); Associate Professor of Mechanical Engineering (1946, 1955).

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PEARCE, J. W., M.D., C.M. (Queen's), D.Phil. (Oxon.); Professor and Head, Department of Physiology and Pharmacology (1955, 1955).

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PILKINGTON, W., M.A., B.Ed. (Alberta); Associate Professor of Secondary Education (1952, 1955); also Assistant to the Dean.

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POIRIER, R., B.A., M.D. (Montreal), R.C.P.S.(C); Lecturer in Paediatrics (1948, 1956).

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POUNDER, J. R., M.A. (Toronto); Assistant Professor of Mathematics (1955, 1955).

POWRIE, T. L., B.S.A., M.A. (Saskatchewan); D.Phil. (Oxon.); Assistant Professor of Economics (1959, 1959).

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PRESHING, W. A., B.A., B.Ed. (Alberta), M.B.A. (Western Ontario); Assistant Professor of Business (1957, 1959).

PRESTON, W. W., B.Sc. (Queen's); Associate Professor of Drawing and Descriptive Geometry (1938, 1950).

PRINCE, A. R., B.A. (Acadia); M.A. (Harvard); Associate Professor of Botany, Calgary (1951, 1955).

PRITCHARD, E. T., B.Sc. (Carleton), M.Sc. (McGill), Ph.D. (Western Ontario); Assistant Professor of Biochemistry (1957, 1957).

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QUON, D., M.Sc. (Alberta), Sc.D. (M.I.T.); Associate Professor of Chemical Engineering (1949, 1958).

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RALETICH, Mrs. Ivana, Lic. (Belgrade); Library Assistant (Applied Science) (1960, 1960).

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RANKIN, A. S., B.Sc. (London), C.A. (Eng.); Assistant Professor of Accounting (1959, 1959).

RAWLINSON, H. E., M.D. (Alberta), M.Sc., Ph.D. (McGill); Professor and Head, Department of Anatomy (1938, 1959).

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REMPEL, P. P., B.A., B.Ed. (Saskatchewan), Ph.D. (Minnesota); Associate Professor of Psychology and Student Counsellor (1959, 1959).

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RENNER, Ruth, M.Sc.(Agric.) (Alberta); Assistant Professor of Household Economics (1960, 1960).

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von RICHTHOFEN, E., Dr.Phil. (Frankfurt); Associate Professor of Romance Languages (1956, 1956).

RICH, C. B., B.S., M.R.C.S., L.R.C.P. (London), F.R.C.P.(C); Clinical Professor of Medicine (1940, 1950).

RICHARD, H. L., M.D. (Alberta), F.R.C.S.(C), F.A.C.S.; Lecturer in Clinical Surgery and in Surgical Anatomy (1939, 1951).

RIEDEL, B. E., M.Sc. (Alberta), Ph.D. (Western Ontario); Professor of Pharmacy 1946, 1959).

RITCHIE, D. C., B.Sc., M.D. (Alberta), F.A.C.S.; Lecturer in Obstetrics and Gynaecology (1950, 1959), also, Instructor in Pathology.

RITTER, R. A., B.E., M.Sc. (Saskatchewan); Associate Professor of Chemical Engineering (1955, 1960).

ROBBLEE, A. R., M.Sc. (Alberta), Ph.D. (Wisconsin); Professor of Poultry Husbandry (1958, 1957).

ROBERTSON, G. R., D.D.S. (Alberta); Sessional Lecturer in Dentistry (1959, 1959).

ROBERTSON, J. A., M.Sc. (Manitoba); Assistant Professor of Soil Science (1955, 1955).

ROBERTSON, R. W., B.Sc., M.D. (Alberta); Lecturer in Ophthalmology (1958, 1959).

ROBINSON, D. B., M.A.Sc. (UBC), Ph.D. (Michigan); Professor and Head, Department of Chemical and Petroleum Engineering (1948, 1959).

ROBINSON, R. O. A., M.A., Ph.D. (Cantab.); Associate Professor of Mathematics (1958, 1958).

RODMAN, F. S. B., M.Sc. (Saskatchewan), Ph.D. (Minnesota), M.D. (Alberta); Assistant Clinical Professor of Therapeutics (1948, 1955).

RODKIEWICZ, C. M., Dip.Ing (Polish University, London); Assistant Professor of Mechanical Engineering (1958, 1958).

ROLSTON, T., L.R.S.M. (London); Assistant Professor of Music (1958, 1958).

ROSE, E. J., A.M. (Brooklyn College); Assistant Professor of English (1958, 1959).

ROSS, C.A., M.D. (Alberta), F.R.C.S.(C); Instructor in Clinical Surgery (1954, 1955).

ROSS, D. M., M.A. (Dalhousie), Ph.D. (Cantab); Professor and Head, Department of Zoology (1960, 1960).

ROSSALL, R., B.Sc., M.B., Ch.B. (Leeds), M.R.C.P., F.R.C.S.(C); Sessional Instructor in Medicine (1960, 1960).

ROSSELL, P. E., M.A. (Sheffield); Assistant Professor, Extension Department (1960, 1960).

ROSTRUP, O., M.D. (Alberta), F.A.C.S., F.R.C.S(C), F.A.A.O.S.; Clinical Professor of Orthopedic Surgery (1939, 1957).

ROUSELL, M. A., B.Com., L.I.A. (McGill), C.A. (Quebec); Accountant (1946, 1956).

RUDY, W. C., B.A. (Western), B.L.S. (Toronto); Library Assistant (Cataloguing) (1958, 1958).

RUSSELL, Phyllis, J., B.A. (Alberta), B.L.S. (Toronto); Medical Librarian (1957, 1957).

RYAN, A. A., M.A. (Alberta); Associate Professor of English (1940, 1952); also, Executive Assistant to the President, and Provost.

RYAN, J. M., B.Sc. (St. Francis Xavier), M.D., C.M. (Dalhousie), L.M.C.C.; Sessional Instructor in Clinical Medicine (1958, 1958).

RYDER, Dorothy E., B.A. (UBC), B.L.S. (McGill); Librarian, Calgary (1957, 1957).

SADLER, G. W., B.Sc. (Saskatchewan), M.Sc. (Illinois); Associate Professor of Mechanical Engineering (1951, 1956).

SALT, W. R., M.Sc. (Alberta); Professor of Anatomy (1949, 1958).

SALTER, F. M., B.A. (Dalhousie), M.A., Ph.D. (Chicago), D.Litt. (Toronto), F.R.S.C., F.R.S.L.; Professor of English (1939, 1959); on staff 1922-25 also.

SAMPLE, J. T., M.A., Ph.D. (UBC); Assistant Professor of Physics (1958, 1958).

SAMUEL, G., M.A. (Glasgow); Associate Professor of French (1948, 1956); also, Administrator of Professional Examinations.

SAMUELS, H. L., B.Sc., D.D.S. (Alberta); Assistant Professor of Periodontia (1948, 1956).

SANDIN, R. B., M.A. (Alberta), Ph.D. (Chicago), F.R.S.C.,; Professor of Chemistry (1919, 1943).

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SCOTT, D. B., B.A. (Toronto), Ph.D. (McGill); Professor of Physics (1940, 1954).

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SHANDRO, W. A., M.D., C.M. (McGill, F.R.C.S.(C); Lecturer in Clinical Surgery (1943, 1953).

SHARP, W. T., B.A., (Toronto), A.M. (Princeton); Associate Professor of Mathematics (1960, 1960).

SHAW, N. G., B.Sc. (New Brunswick); Secretary of the Banff School of Fine Arts (1959, 1959).

SHERMAN, L., M.B. (Poznan); Instructor in Clinical Medicine (1955, 1956).

SHERBANIUK, D. J., B.A., LL.B. (Alberta); Associate Professor of Law (1955, 1960).

SHIELDS, R. A. M., M.A. (Manitoba); Assistant Professor of History, Calgary (1960, 1960).

SHNITKA, T. K., M.Sc., M.D. (Alberta); Assistant Professor of Pathology (1954, 1959).

SHUTE, D., M.B., Ch.B., M.D. (Manchester), D.T.M. (Liverpool); Director of Provincial Laboratory of Public Health, Calgary (1949, 1949).

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SINCLAIR, S. R., M.Sc. (Alberta); Professor of Civil Engineering (1945, 1959).

SKEITH, Mary E., B.A. (Queen's), B.L.S. (McGill); Chief Processing Librarian, Calgary (1960, 1960).

SKOROPAD, W. P., M.Sc. (Alberta), Ph.D. (Wisconsin); Assistant Professor of Plant Pathology (1959, 1959).

SKREPNECK, Natalie, B.Sc. (Alberta); Assistant Dietitian (1959, 1959).

SLABYJ, B. M., B.Sc. (Alberta); Instructor in Microbiology (1960, 1960).

SLAVUTYCH, Y., A.M., Ph.D. (Pennsylvania); Assistant Professor of Modern Languages (1960, 1960).

SMILLIE, L. B., B.Sc. (McMaster), M.A., Ph.D. (Toronto); Associate Professor of Biochemistry (1955, 1957).

SMITH, A., Q.C., B.A., LL.B. (Alberta), LL.M., J.S.D. (Stanford); Professor of Law (1947, 1950).

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SMITH, D. E., M.A. (Queen's), Ph.D. (Harvard); Dean of the Faculty of Arts and Science (1937, 1958).

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SMITH, P. J., M.A. (New Zealand); Assistant Professor of Geography (1959, 1959).

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SPARBY, H. T., B.Sc., M.A. (Alberta), Ph.D. (Stanford); Professor of Educational Administration (1946, 1956).

SPARLING, Mrs. J. Grant, B.A., Dip.S.W. (Toronto); Dean of Women (1960, 1960).

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SPEARMAN, D., M.A. (McGill), M.A., Ph.D. (Montreal); Associate Professor of Philosophy and Psychology (1948, 1955).

SPENCER, Mary E., B.A. (Saskatchewan), M.A. (Bryn Mawr), Ph.D. (California); Associate Professor of Biochemistry (1953, 1957).

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STIRRAT, J. H., B.Sc., M.B., Ch.B., M.D. (Glasgow); Professor of Pathology (1948, 1957).

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STRUTZ, W., B.A. (Saskatchewan), M.D. (Alberta), F.R.C.S.(C); Instructor in Surgery (1957, 1959).

STUART, R. D., M.B., Ch.B., M.D., D.Sc., D.P.H. (Aberdeen), F.R.F.P.S. (Glasgow); Professor of Bacteriology (1949, 1949).

SUCHOWERSHY, C. N., D.Jur. et Rer.Pol. (Czernowitz); Library Assistant, Cataloguing (1960, 1960).

SUTHERLAND, Margaret I., B.A. (Alberta); Library Assistant, Medical Reading Room (1960, 1960).

SWALLOW, Kathleen, B.Sc., M.D. (Alberta); Assistant Clinical Professor of Paediatrics (1953, 1959).

SWALLOW, R. J., M.D. (Alberta); Instructor in Pathology (1958, 1959).

SZOVERFFY, J., Ph.D. (Budapest), Dr.phil.habil. (Fribourg); Assistant Professor of German (1959, 1959).

TAKEO, M., M.S., Ph.D. (Oregon); Assistant Professor of Mathematics, Calgary (1959, 1959).

TAYLOR, J. B., A.O.C.A. (Toronto); Associate Professor of Art (1947, 1958).

TAYLOR, J. D., M.Sc. (Alberta), Ph.D. (Saskatchewan); Lecturer in Pharmacology (1957, 1959).

TAYLOR, M. G., M.A., Ph.D. (California); Principal, University of Alberta in Calgary (1960, 1960).

TAYLOR, R. F., M.D., C.M. (McGill); Demonstrator in Physiology and Pharmacology (1958, 1959).

TAYLOR, R. S., B.A., M.S., Ph.D. (Minnesota); Assistant Professor of Geology (1956, 1956).

TAYLOR, W. C., M.B., Ch.B. (Aberdeen), D.C.H., F.R.C.P.(C); Associate Professor of Paediatrics (1957, 1959).

TEGART, R. L., D.D.S. (Alberta); Assistant Professor of Operative Dentistry (1958, 1959).

TERENTIUK, F., B.Sc. (Alberta), M.A., Ph.D. (UBC); Assistant Professor of Physics, Calgary (1958, 1958).

THEMAN, A. E., M.D. (Manitoba), F.R.C.S.(C); Instructor in Surgery (1957, 1959).

THOMAS, L. G., M.A. (Alberta), Ph.D. (Harvard); Professor of History (1938, 1958).

THOMPSON, A. R., LL.B. (Manitoba), LL.M. (Toronto); Associate Professor of Law (1957, 1957).

THOMPSON, J. S., M.A. (Saskatchewan), M.D. (Toronto); Professor of Anatomy (1950, 1956); also, Assistant Dean of Medicine.

THOMPSON, Margaret W., B.A. (Saskatchewan), Ph.D. (Toronto); Assistant Professor of Human Genetics (1953, 1959).

THOMSON, K. H., M.A.,M.Ed. (Alberta), Ed.D. (California); Associate Professor of Education (1960, 1960).

THOMSON, R K. C., B.Sc., M.D. (Alberta), F.A.C.P.; Clinical Professor of Medicine (1939, 1959).

TOOGOOD, J. A., B.Sc. (Alberta, Ph.D. (Minnesota); Professor of Soil Science, and Head of Department (1948, 1958).

TOSHACH, Sheila, B.Sc. in H.Ec. (Alberta), M.A. (Toronto); Assistant Professor of Bacteriology (1957, 1957).

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TUBA, J., M.Sc. (Saskatchewan), Ph.D. (Toronto); Professor of Biochemistry (1942, 1952).

TUCKER, G. N., M.D. (Toronto); Lecturer in Urologic Surgery (1938, 1948).

TURTON, M. R., M.D. (Toronto); Sessional Instructor in Paediatrics (1958, 1958).

UHL, C. N., B.A. (Stanford), M.S., Ph.D. (Oregon); Assistant Professor of Psychology (1958, 1958).

UNRAU, J., B.S.A., M.Sc. (Saskatchewan), Ph.D. (Washington); Professor and Head, Department of Plant Science (1949, 1951).

URSCHEL, A. R., D.D.S. (Alberta); Lecturer in Prosthetic Dentistry (1959, 1958).

VAN ALSTINE, R. S., D.D.S. (Alberta), M.S. (Michigan); Associate Professor of Oral Surgery (1953, 1953).

VAN VLIET, M. L., M.S. (Oregon), Ed.D. (UCLA); Professor and Director of the School of Physical Education (1945, 1954).

VANDER WELL, A. R., B.A. (Central College, Iowa), M.A. (Iowa State); Counsellor (1959, 1959).

VANT, J. R., B.A. (Saskatcehwan), M.D. (Manitoba), F.A.C.S., F.R.C.S.(C), F.R.C.O.G.; Professor of Obstetrics and Gynaecology (1932, 1942)

VENKATESAN, D., B.Sc. (Benares), Ph.D. (Allahabad); Assistant Professor of Physics, Calgary (1960, 1960).

VERSCHUREN, J. P., Ir. (Delft); Assistant Professor of Civil Engineering (1954, 1956).

VOZOFF, K., B.S. (Minnesota), M.S. (Pennsylvania), Ph.D. (M.I.T.); Assistant Professor of Geophysics (1958, 1958).

WALKER, B. E., M.A. (Alberta), Ph.D. (Stanford), Diplome dè l'E.P.E.F.E. (Sorbonne); Professor of Secondary Education (1947, 1957).

WALLACE, W. J., B.A. (UBC), Ph.D. (Purdue); Associate Professor of Chemistry (1954, 1958).

WARWARUK, J., B.Sc. (Alberta), M.Sc. (Illinois); Assistant Professor of Civil Engineering (1960, 1960).

WATSON, W., B.A. (UBC), M.A., Ph.D. (Toronto); Associate Professor of English (1951, 1957).

WEBSTER, G. R., M.Sc. (UBC), Ph.D. (Oregon); Assistant Professor of Soil Science (1960, 1960).

WEICHMAN, F. L., B.S. (Brooklyn College), Ph.D. (Northwestern); Assistant Professor of Physics (1958, 1958).

WEIJER, J., M.Sc., Ph.D. (Groningen); Professor of Genetics and Plant Breeding (1957, 1960).

WEINLOS, C. H. W., B.A., M.D. (Alberta), F.R.C.S(C); Instructor in Clinical Surgery (1949, 1958).

WEINLOS, M., B.A., M.D. (Alberta), F.R.C.S. (Edinburgh), F.R.C.S(C); Assistant Professor of Pathology and Assistant Clinical Professor of Surgery (1930, 1957).

WHEELER, B. M., M.B|E., M.D. (Alberta), F.R.C.P.(C); Clinical Professor of Medicine (1949, 1959).

WHIDDEN, J. M., B.Com. (Alberta); Bursar (1947, 1948).

WHITE, Alice G. Ed.B. (Eastern Illinois), A.M. (Dhio), Ph.D. (Iowa); Assistant Professor of English (1955, 1956).

WHITING, R. H., B.A. (Toronto), M.D., C.M. (McGill), F.R.C.P.(C), F.A.C.P,; Lecturer in Clinical Medicine (1947, 1954).

WHITNEY, E. L., B.Sc. (Alberta), A.M., Ph.D. (Harvard); Associate Professor of Mathematics (1957, 1957).

WHYTE, J. H., B.Sc.(Agric.) (Edinburgh), M.Sc., Ph.D. (McGill); Professor of Botany (1939, 1958).

WILKINSON, D., M.B., B.S. (St. Bartholomew's Hospital, U. of London); Teaching Fellow in Paediatrics (1960, 1960).

WILLIAMS, H. T. G., M.B., Ch.B. (Liverpool), F.R.C.S. (England), F.R.C.S(C); Instructor in Surgery and Clinical Tutor (1958, 1958).

WILLIAMS, Mary E., M.B., Ch.B. (Liverpool); Assistant Professor of Bacteriology, and Assistant Bacteriologist in the Provincial Laboratory (1957, 1959).

WILLOX, G. L., M.D. (Alberta), F.R.C.S.(C), F.A.C.S.; Clinical Professor of Surgery (1951, 1957).

WILSON, B. G., B.Sc. (Queen's University, Belfast), Ph.D. (National University of Ireland); Associate Professor of Physics, Calgary (1957, 1960).

WILSON, D. R., B.A. (Oxon.), M.D., C.M. (McGill), F.R.C.P.(C), F.A.C.P.; Professor of Medicine (1947, 1954).

WILSON, G. L., M.D. (Alberta); Lecturer in Orthopedic Surgery (1947, 1956).

WILSON, Lolita, N., M.A. (UBC); Associate Professor of Psychology (1951, 1959).

WILSON, T. C., M.D., C.M. (Queen's); Lecturer in Oto-Laryngology (1958, 1959).

WILSON, T. S., B.Sc. (New Brunswick), M.D. (Toronto), F.R.C.S(C), F.A.C.S.; Clinical Professor of Surgery (1949, 1954).

WINCH, D. M., B.Sc., Ph.D. (London); Assistant Professor of Economics (1960, 1960).

WINSPEAR, A. D., B.A. (Queen's), M.A. (Oxon.); Associate Professor of Classics, Calgary (1957, 1959).

WISHART, R. B., B.Com. (Toronto); Administrator of Student Awards (1959, 1959).

WOHLFARTH, H., Extension Assistant Professor of Art.

WONDERS, W. C., B.A., Ph.D. (Toronto), M.A. (Syracuse); Professor of Geography (1953, 1957).

WOOD, F. W., M.Sc. (Alberta); Assistant Professor of Dairy Science (1946, 1946).

WOODS, S. B., M.A. (Saskatchewan), Ph.D. (UBC); Associate Professor of Physics (1959, 1959).

WOODSWORTH, J. G., B.A., B.Ed. (Alberta), Ed.D. (Stanford); Associate Professor of Educational Psychology, Calgary (1951, 1956).

WORTH, W. H., M.Ed. (Alberta), Ph.D. (Illinois); Associate Professor of Elementary Education (1955, 1957).

WYMAN, M., B.Sc. (Alberta), Ph.D. (California Institute of Technology), F.R.S.C.; Professor of Mathematics (1943, 1956).

YATES, E. N., A.O.C.A., Assistant Professor of Art (1954, 1958).

YONEDA, Y., M.D. (Alberta), F.R.C.S.(C); Lecturer in Obstetrics and Gynaecology (1955, 1959).

YONGE, K. A., M.D., C.M. (McGill), D.P.H. (London); Professor and Head, Department of Psychiatry (1957, 1957).

YOUDELIS, W. V., B.Sc. (Alberta), M.Sc., Ph.D. (McGill); Assistant Professor of Metallurgy (1958, 1958).

YOUNG, B. S., M.A. (Cantab.), M.A. (Rhodes); Assistant Professor of Geography (1960, 1960).

YOUNG, M. K., M.D. (Alberta); Instructor in Clinical Medicine (1949, 1952).

ZALESKY, N., M.D. (Prague and Lwow); Lecturer in Clinical Medicine (1954, 1959).

ZALIK, S., B.S.A., M.Sc. (Manitoba), Ph.D. (Purdue); Associate Professor of Plant Physiology and Biochemistry (1952, 1956).

ZENTNER, H., B.A. (UBC), M.A., Ph.D. (Stanford); Assistant Professor of Sociology, Calgary (1960, 1960).

ZINTEL, Frances M., B.S.H.Ec. (Saskatchewan); Lecturer in Household Economics (1959, 1959).

Honorary Members

ALEXANDER, N. E., M.D. (Alberta), F.A.C.S.; Honorary Associate Clinical Professor of Surgery.

ANDERSON,A. F., M.D., C.M. (Manitoba); Honorary Instructor in Clinical Medicine.

ANDERSON, R. L., M.D. (Alberta), F.R.C.S.(C), F.A.C.S.; Honorary Associate Professor of Surgery.

BAKER, K., M.B., Ch.B., M.D. (Liverpool), M.R.C.O.G.; Honorary Sessional Instructor in Obstetrics and Gynaecology.

BELL, R. E., m.i.d., M.D. (Alberta); Assistant Professor of Pathology (1950, 1954); and Honorary Lecturer in Medicine (1958).

BLAIS, The Honorable A., M.D., B.S. (Laval), F.A.C.S.; Honorary Professor of Clinical Surgery.

BARR, J. S., M.B., Ch.B. (Glasgow), M.R.C.O.G.; Honorary Sessional Instructor in Obstetrics and Gynaecology.

CAIRNS, His Honour Judge L. Y., Q.C., B.A., LL.D. (Alberta); Honorary Professor of Law.

CARMICHAEL, J. E., B.Sc., M.D., C.M. (Queen's); Honorary Instructor in Anaesthesia.

CLARK, Jeanie S., B.Sc. (Alberta), M.P.H. (John Hopkins), R.N. (School of Nursing, University of Alberta Hospital), C.M.B. (Royal Infirmary, Edinburgh), Director of Nursing, School of Nursing, University of Alberta Hospital; Honorary Lecturer.

CLAY, J. W., L.D.S. (Ontario), D.D.S. (Pennsylvania and Toronto), F.I.C.D.; LL.D. (Alberta); Honorary Lecturer in Oral Surgery.

DAY, A., M.B. (Toronto); Honorary Clinical Professor of Obstetrics and Gynaecology.

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ELTON, C. D., M.R.C.S., L.R.C.P., D.A. (London); Honorary Sessional Instructor in Anaesthesia.

FORD, The Honorable F. Q.C., B.C.L. (Trinity), D.C.L. (Toronto), LL.D. (Alberta), LL.D. (Laval); Honorary Professor of Law.

GANS, L. J., B.Sc., M.D. (Alberta); Honorary Sessional Instructor in Obstetrics and Gynaecology.

GREENE, E., M.D., C.M. (McGill), F.R.C.S. (Edinburgh), F.A.C.S.; Honorary Lecturer in Surgical Anatomy.

HALL, GERTRUDE M., R.N. (School of Nursing, Winnipeg General Hospital), P.H.N. (McGill), Director, School of Nursing, Calgary General Hospital; Honorary Lecturer.

HALL, M. E., B.A., M.B. (Toronto); Honorary Associate Professor of Pathology.

HARYETT, R. D., D.D.S., M.Sc. (Toronto); Honorary Lecturer in Physiology.

HEMSTOCK, J. R., B.Sc., M.D. (Alberta); Honorary Sessional Instructor in Anaesthesia.

HUCKELL, R. G., M.D., C.M. (McGill), F.A.A.O.S.; F.A.C.S.; Honorary Clinical Professor of Surgery.

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HUSEL, D. H., B.Sc., M.D. (Alberta); Honorary Sessional Instructor in Obstetrics and Gynaecology.

JELLINEK, E. M., Hon.M.D., F.A.A.A.S.; Honorary Sessional Lecturer in Psychiatry (1959, 1959).

KEEPING, Eleanor S., M.Sc. (Alberta), Ph.D. (Manitoba); Honorary Research Associate in Botany.

KYLE, W. D., B.Sc., M.D. (Alberta); Honorary Sessional Instrutcor in Anaesthesia.

le VANN, L. J., L.R.C.P., L.R.C.S. (Edinburgh); Honorary Lecturer in Psychiatry.

McALISTER, W. J., M.C., M.D., C.M. (McGill); Honorary Instructor in Psychiatry.

McCALLA, R. I., B.Sc., M.D. (Alberta); Sessional Instructor in Pharmacology, and Honorary Sessional Instructor in Anaesthesia.

McCULLOUGH, D. L., M.D., B.C.L. (Trinity College, Dublin), D.P.M. (London); Honorary Instructor in Psychiatry.

McINTYRE, J. W. R., M.R.C.S., L.R.C.P., D.A. (England); Honorary Sessional Instructor in Anaesthesia.

McINTYRE, R. R., D.D.S., L.D.S. (Toronto), F.I.C.D.; Honorary Professor of Orthodontics.

MacLEAN, R. R., M.D. (Alberta), F.A.P.A.; Honorary Clinical Professor of Psychiatry.

McMURCHY, K. A., B.A. (Easkatchewan), D.D.S. (Alberta); Honorary Instructor in Anatomy.

MARTLAND, The Honorable Mr. Justice R., B.A., LL.B. (Alberta), B.C.L. (Oxon.); Honorary Professor of Law.

MICHIE, T. C., M.D. (Alberta); Honorary Lecturer in Psychiatry.

MINISH, N. J., M.D. (Manitoba); Honorary Assistant Professor of Anatomy.

MOYER, D. J., M.D. (Western Ontario); Honorary Sessional Instructor in Obstetrics and Gynaecology.

NESS, H. B., D.D.S. (Minnesota), L.D.S. (Saskatchewan); Honorary Lecturer in Crown and Bridge Work.

OSTROLOSKY, R. J., B.Sc., M.D. (Alberta), F.R.C.S.(C), M.R.C.O.G. (London); Honorary Sessional Instructor in Obstetrics and Gynaecology.

PROCTER, R., M.D. (Manitoba); Honorary Lecturer in Radiology.

QUIGLEY, W. A., L.D.S., D.D.S. (Toronto), M.S. (Michigan); Honorary Professor of Orthodontics.

ROONEY, R. A., D.D.S. (Valpariso); Honorary Professor of Prosthetic Dentistry.

SCHUMACHER, Marguerite E., B.Sc. (Western Reserve), M.A. (Columbia), R.N. (Victoria Hospital, Winnipeg); Advisor to Schools of Nursing in Alberta.

SCRAGG, R. D., B.Sc., M.D. (Alberta); Honorary Lecturer in Pharmacology.

SPEAKMAN, T. J., M.D. (Manitoba), M.Sc. (McGill), F.R.C.S.(C); Honorary Lecturer in Physiology.

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TRIANTAPHYLLOPOULOS, D., M.D. (Athens); Honorary Lecturer in Physiology and Pharmacology.

WEIR, N. W. F., M.B., B.Ch., B.A.D. (Belfast), M.R.C.O.G.; Honorary Sessional Instructor in Obstetrics and Gynaecology.

EMERITI

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HERBERT EDGAR SMITH, B.A. (Illinois), M.A., M.Ed. (Alberta), Ph.D. (California); Professor Emeritus of Education.

PERVIVAL SYDNEY WARREN, B.A. (Toronto), A.R.C.S. (London), Ph.D. (Toronto), F.R.C.S.; Professor Emeritus of Geology.

MABEL PATRICK, B.A. (Toronto), M.A. (Columbia); Professor Emeritus of Household Economics.

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WILLIAM SCOTT HAMILTON, D.D.S. (Toronto), F.A.C.D., F.D.S.R.C.S. (England); Professor Emeritus of Oral Surgery.

ROSS WILLIAM COLLINS, M.A. (Acadia), B.D. (Union Theological Seminary), Ph.D. (Columbia), F.R.Hist.S.; Professor Emeritus of History.

EZRA HENRY MOSS, M.M., M.A., Ph.D. (Toronto), F.R.S.C.; Professor Emeritus of Botany.

HAROLD RAY THORNTON, B.Sc. (Alberta), Ph.D. (Wisconsin); Professor Emeritus of Dairy Science.

EVANGELINE ALBERTA HASTIE, B.A. (Toronto); Associate Professor Emeritus of Physical Education.

JOHN WILLIAM SCOTT, M.D., C.M. (McGill), F.R.C.P.(C), F.A.C.P.; Professor Emeritus of Medicine.

JOHN EDLESTON BOWSTEAD, M.Sc., Ph.D. (Wisconsin); Professor Emeritus of Animal Husbandry.

HUGH ALTON MacGREGOR, B.Sc. (Alebrta), M.Sc. (Cornell), Ed.D. (Oregon State College); Professor Emeritus of Education.

MARK ROBERT MARSHALL, M.M., M.D., C.M. (McGill), D.L.O. (England), F.R.C.S.(C), F.A.C.S.; Professor Emeritus of Ophthalmology.

RALPH FAUST SHANER, Ph.B. (Lafayette), Ph.D. (Harvard), F.R.S.C.; Professor Emeritus of Anatomy.

ACADEMIC COSTUME

All gowns are to be of the customary Cambridge shape, i.e., for undergraduates, a gown of black material not falling below the knee with round sleeve cut above elbow; for bachelors, a gown of black material falling below the knee with full sleeve cut to elbow and terminating in a point; for masters, doctors of medicine and doctors of dental surgery a gown of black material falling below the knee with black sleeves with semi-circular cut at bottom.

Hoods are to be of the Oxford pattern, and of spruce green material.

The bachelor's hood is to have a border (1½ inches wide), the master's a full lining, of the color distinctive of the faculty. The M.D. and D.D.S. hoods are to be of the master's pattern.

The faculty colors are:

For Arts (including LL.D.)	White
For Agriculture	Pale Blue
For Commerce	Silver Gray
For Dentistry	Maroon
For Divinity	Purple
For Education	Royal Blue
For Engineering	Light Green
For Household Economics	Pink
For Law	Scarlet
For Medicine	Crimson
For Nursing (B.Sc.)	Crimson and White
For Pharmacy	Cinnamon
For Physical Education	Royal Blue and Gold

Doctors' gowns (Ph.D., Ed.D., D.Sc. and D.Litt.) are to conform to the Intercollegiate Code in design. They are to be of black material and the velvet trim is to be *Philosophy blue* for the Ph.D. gown and black for all others. Doctors of Laws are entitled to wear a full-dress scarlet robe faced with white silk.

All doctor's hoods (Ph.D., Ed.D., D.Sc. and D.Litt.) are to conform to the Intercollegiate Code in shape, size and color. They are to be of black material to match the gown, and the full lining is to be of gold satin with a six-inch green satin chevron. The velvet trim distinguishes the four degrees and is to be: Ph.D.—Philosophy blue; Ed.D.—Education light blue; D.Sc.—Science gold-yellow; D.Litt.—Letters white. There is to be a narrow green piping where the gold lining joins the black material. The LL.D. hood is of scarlet silk and of the Cambridge form and has a full lining of white silk.

All caps are to be of the ordinary black trencher shape with black tassels, with a black velvet cap with gold cord for LL.D. full dress.

THE LIBRARY

The Library of the University contains 206,000 accessioned volumes, and 25,000 volumes in the Library at Calgary, a total of 231,000 volumes.

The University's main book collection is housed in the Rutherford Library. The Main Circulation Desk, and Catalogue are in the Delivery Hall on the second floor, with the Periodical Room and the Main Reading Room opening from it. The Periodical Room contains about 1,000 current journals and newspapers of general interest. The Main Reading Room houses the General Reference collection, as well as an open-shelf collection of books of special interest to undergraduates.

Other special reading rooms in the building are: The Reserve room, containing approximately 3,500 volumes of required reading for the Arts and Science courses; the Weir Memorial Law Library; the Medical Sciences Reading Room (for Medicine, Dentistry, Pharmacy, Nursing and Physiotherapy); and the Applied Sciences Reading Room (for Agriculture, Engineering, and Chemistry).

The stack room, which houses the bulk of the book collection, occupies the entire south side of the building. Certain categories of senior students have access to it, and all students may borrow from it.

The building also contains seminar and conference room for small classes, an art gallery and museum, and a music listening room, where concerts of recordings are given during the noon hour.

The Education Library is housed in the Education Building. The University of Alberta at Calgary has its own Library.

The Library subscribes to 2,000 of the more important general and technical journals, which are available for consultation.

Staff:

B. B. PEEL, M.A. (Saskatchewan), B.L.S. (Toronto); Librarian to the University.
DOROTHY I. HAMILTON, B.A. (Alberta), M.Sc. in L.S. (Washington), A.M.L.S. (Michigan); Reference Librarian.
NORMA E. FREIFIELD, B.A. (Alberta), B.L.S. (Toronto); Circulation Librarian.
LILIAN E. M. LEVERSEDGE, B.A. (Alberta), B.L.S. (Toronto); Order Librarian.
D. A. BAIRD, B.A. (British Columbia), M.S. (Columbia); Chief Cataloguer.

DOROTHY E. RYDER, B.A. (British Columbia), B.L.S. (McGill); Librarian, Calgary.
EMMA MacDONALD, B.A. (British Columbia), B.L.S. (Toronto); Applied Science Librarian.
D. NODEN, M.A. (Cantab.), B.L.S. (McGill); Law Librarian.
MOIRA L. ENGLISH, B.A. (British Columbia), M.L.S. (Washington); Education Librarian.
PHYLLIS RUSSELL, B.A. (Alberta), B.L.S. (Toronto); Medical Librarian.
YVONNE FENTON, B.A. (Dunelin), A.L.A. (England); Library Assistant (Cataloguing).
LOIS J. CARRIER, B.A. (Saskatchewan), B.L.S. (Toronto); Library Assistant (Reference).
LOUISE RANGE, B.A. (Saskatchewan), B.L.S. (McGill); Library Assistant (Reference).
W. C. RUDY, B.A. (Western Ontario), B.L.S. (Toronto); Library Assistant (Cataloguing).
PATRICIA J. McNEILL, B.A. (Alberta); Library Assistant (Circulation).
S. HARLAND, M.A. (Leeds), F.L.A. (England); Library Assistant.
HAZEL E. MILNE, B.A. (Saskatchewan), Library Assistant (Cataloguing), Calgary.
IVANA RALETICH, Lic. (Belgrade), Library Assistant, (Applied Science).
MARGARET I. SUTHERLAND, B.A. (Alberta); Library Assistant (Medical).
SHIRLEY E. MODNEY, B.A. (Saskatchewan); Library Assistant (Reference).
C. N. SUCHOWERSKY, D.Jur. er Rec. Pol. (Czernowitz); Library Assistant (Cataloguing).
PAULINE DUBY, B.A. (Alberta); Library Assistant (Calaloguing).
A. KANTAUTAS, B.Com. (Copenhagen); Library Assistant (Order Department).

THE DEGREE OF BACHELOR OF DIVINITY

By an arrangement with St. Stephen's College, the degree of Bachelor of Divinity is offered by the University to graduates in the Faculty of Arts and Science. Admission to the B.D. program is open only to students who have completed a minimum of one year's study in Theology. The course of study is prescribed by the College and must be approved by the General Faculty Council Committee on the Bachelor of Divinity degree. The number of courses which may be taken extramurally in a winter session is restricted to two. In all courses taken toward the B.D. degree the pass mark is 65%. No supplemental examinations are permitted.

In the case of a student unknown to the Faculty of St. Stephen's College, or one who has allowed considerable time to elapse since taking his theological course, it shall rest with the Committee on the B.D. degree to decide whether, before being accepted as a candidate, he shall be required to take one of the following: (a) some intramural studies, or (b) a preliminary comprehensive examination.

For further information regarding this course, application should be made to the Registrar.

INDUSTRIAL LABORATORIES

The Department of Industrial Laboratories operates fully equipped chemical and physical laboratories for carrying out analyses and tests on all materials. Industrial investigations can be undertaken.

For complete information and schedule of fees, apply to the Director and Provincial Analyst, Mr. C. E. Noble, B.A., B.Sc.

AFFILIATED INSTITUTIONS

Certain educational or research organizations in the Province are related to the University either historically, or by resolutions of the University's governing bodies, or for mutual advantage, or under the University's regulations dealing

with affiliation of junior colleges, or in more of these ways than one. It is a characteristic of such of these institutions as teach or hold examinations that these activities are, in part, directly related to the programs of the University. The relationship between them and the University is customarily described by the term *Affiliation.*

The affiliated institutions are listed below, the junior colleges following the others.

The University Hospital

The University of Alberta Hospital has a bed capacity of 1,200. The distribution of beds to the various services is fairly uniform. The hospital is administered by a Board appointed by the Lieutenant Governor in Council. Two members of the Board, the President of the University and the Dean of the Faculty of Medicine, are statutory members. Further details may be found in the calendars of the Faculties of Medicine and Dentistry.

From 1922 to 1929 the hospital was administered by the University. Students in Medicine, Dentistry and the degree course in Nursing receive instruction there.

The Hospital Board members are:

D. J. Avison, Esq., Chairman
E. E. Roper, Esq.
Dr. A. Somerville
Edward Mather, Esq.
President Johns
Dean MacKenzie
F. G. Stewart, Esq.

The Superintendent is Dr. A. C. McGugan, M.D., D.P.H.

St. Stephen's College

St. Stephen's College is the Divinity School of the United Church of Canada in the Province of Alberta. Details of courses are set out in the Faculty of Arts and Science calendar.

The College erected its first building on the campus in 1910. It provides courses which are accepted for credit towards University degrees, and houses some 150 students.

Its staff includes the following:

EDMUND JABEZ THOMPSON, M.A. (Alberta), B.D., Ph.D. (Chicago), D.D. (United College, Winnipeg);Principal, Professor of Christian Theology and the Philosophy of Religion, The John M. Miller Professor of Practical Theology.

DAVID JOHN CLIFTON ELSON, B.A., (Alberta), M.A. (Columbia), D.D. (St. Andrew's, Saskatoon); Dean, Professor of New Testament Language and Literature.

CHARLES FRANKLIN JOHNSTON, M.A. (McGill), B.D. (U.T.C., Montreal), S.T.M., Th.D. (Union); Professor of Church History, Librarian, Chaplain of St. Stephen's Residence.

GEORGE LINDSAY VOGAN, B.A., B.D., (Queen's), M.A. (Cambridge); Associate Professor of Old Testament Language and Literature.

St. Joseph's College

This College, established under the authority of the Roman Catholic Church, is directed by the Brothers of the Christian Schools (Christian Brothers). Details of courses are set out in the Faculty of Arts and Science calendar.

The College was affiliated with the University under an agreement made in 1926. It provides courses which are accepted for credit towards degrees, and houses some 100 students.

Its staff includes the following:

BROTHER ALOYSIUS, M.A. (Alberta), M.A. (Catholic University of America); Professor of Christian Apologetics.
BROTHER ANSELM, B.A. (Western Ontario), M.A. (Ottawa); Professor of Philosophy.
BROTHER BONAVENTURE, M.A. (Toronto), Ph.D. (London); Professor of History.

The Provincial Institute of Technology and Art

This institution, situated in Calgary and operating under the authority of the Department of Education, was affiliated with the University of Alberta by resolution of the Senate, May 13, 1926.

In addition to courses of the nature implied by its title, it provides instruction in programs leading to the degree of B.Ed. in Industrial Arts.

The Principal is Mr. E. W. Wood, M.E.I.C., M.I.Mar.E.

The Western Board of Music

This board was founded in 1935 in order to conduct examinations of a high standard in Music. In it are associated the Universities and the Departments of Education of Alberta, Manitoba and Saskatchewan.

The organization in Alberta is under the University Committee on Music, and the University awards the diplomas of A.Mus. (Alberta) and L.Mus, (Alberta) for the second highest and the highest grades, respectively, in the various subjects. Passes in certain examinations of the Board are required of students proceeding towards the degree of Bachelor of Music.

Theoretical and practical examinations are held in Alberta in February and the summer of each year.

Further details, including information about prizes and awards, are to be found in the Music Syllabus, or other official publication obtainable from the Western Board of Music, Department of Fine Arts, University of Alberta.

The Research Council of Alberta

This was formed in 1919 by the Province and the University for the general purpose of conducting economic research into the resources of the Province. For many years it was housed in University buildings. Collaboration between the Council and the University continues in a number of fields. The President of the University is a member of the Council.

The staff of the Council includes the following:

Administrative Officers:

N. H. GRACE, M.B.E., M.A. (Saskatchewan), Ph.D. (McGill), F.R.S.C.; Director of Research.
W. A. LANG, M.Sc. (Alberta); Secretary of Council, and Assistant Director of Research.
Kathleen S. WARK, B.Com. (Alberta); Accountant.
Vera L. STOVER, M.Sc. (Alberta); Librarian.

Fuels Branch:

H. W. HABGOOD, M.Sc. (Queen's), M.S., Ph.D. (Michigan); Chief, Fuels Branch.
N. BERKOWITZ, Ph.D. (London); Head, Coal Division.
R. M. ELOFSON, B.Sc. (Alberta), Ph.D. (Wisconsin); Senior Scientist in Organic Chemistry.
J. C. WOOD, B.Sc. (Alberta), Ph.D. (McGill); Chemist.
J. D. CAMPBELL, B.A (McMaster), M.A. (British Columbia), Ph.D. (McGill); Paleobotanist.

C. MORELAND, B.Sc. (Leicester), Dip. Chem. Eng. (Manchester), Ph.D. (Birmingham); Engineer.
G. R. PEARSON, B.Sc. (Nottingham), M.Sc. (McMaster), Ph.D. (Queen's); Geologist.
N. MELNYK, B.Sc. (Alberta); Engineer.
E. J. JENSEN, M.Sc. (Copenhagen); Engineer.
J. F. FRYER, B.Sc. (Alberta); Chemist.
S. MOSCHOPEDIS, B.Sc. (Athens); Chemist.
R. B. J. DENCER, B.Sc. (Alberta); Chemist.
M. P. ROSENBLOOM, B.Sc., Dip. Chem. Eng.(London); Engineer.
G. W. HOGSON, M.Sc. (Alberta), Ph.D. (McGill); Head, Petroleum Division.
K. A. CLARK, M.A. (McMaster), Ph.D. (Illinois); Engineer Consultant.
D. S. PASTERNACK, B.Sc. (Queen's), M.Sc., Ph.D. (McGill); Chemist.
A. T. BLADES, B.Sc. (Western Ontario), Ph.D. (Wisconsin); Chemist.
B. HITCHON, Ph.D. (Manchester); Geologist.
G. F. ROUND, Ph.D. (Birmingham); Engineer.
B. L. BAKER, M.Sc. (Alberta); Chemist.
M. E. CHARLES, B.Sc. (London), M.Sc. (Alberta); Engineer.
P. J. REDBERGER, B.Sc. (Moravian College); Mathematician.
M. G. WALLBRIDGE, B.Sc. (London), Ph.D. (Exeter); Post-doctoral Fellow, Petroleum.
L. F. NEUFELD, B.Sc. (Alberta); Chemist.
R. NEWTON, B.Sc. (London); Mathematician.
R. D. SLANICEANU, Dipl.Eng. (Bucharest), D. Econ. (Florence); Engineer, Natural Gas.
D. W. BASSETT, Ph.D. (London); Post-doctoral Fellow, Natural Gas.
Dora M. SAUNDERS, B.Sc. (Alberta); Chemist, Microbiology.
J. S. CHARLESWORTH, B.Sc. (Alberta); Chemist in Charge, Gasoline and Oil Testing Laboratory.
Gladys M. STOTT, B.Sc. (Alberta); Chemist.
Margery E. ROWBOTHAM, B.Sc. (Alberta); Chemist.

Earth Sciences Branch:

C. P. GRAVENOR, B.A. (Toronto), M.Sc. (Wisconsin), Ph.D. (Indiana); Chief, Earth Sciences Branch.
R. GREEN, Ph.D. (Dunelm); Head, Geology Division.
J. D. GODFREY, B.Sc. (Nottingham), M.Sc. (Chicago); Geologist.
D. J. KIDD, M.Sc., Ph.D. (Toronto); Geologist.
J. H. WALL, B.Sc. (New Brunswick), M.Sc. (Alberta), Ph.D. (Missouri); Geologist.
L. B. HALFERDAHL, M.Sc. (Queen's), Ph.D. (Johns Hopkins); Geologist.
M. A. CARRIGY, M.Sc. (Western Australia); Geologist.
G. J. GOVETT, B.Sc. (South Wales), D.I.C., Ph.D. (London); Geologist.
L. A. BAYROCK, M.Sc. (Alberta); Geologist.
G. B. MELLON, M.Sc. (Alberta), Ph.D. (Penn. State); Geologist.
C. MOFFET, B.Sc. (Alberta); Geologist.
Mary W. McKAY, B.Sc. (Alberta); Geologist.
W. A. MENELEY, B.Sc. (Saskatchewan); Acting Head, Groundwater Division.
D. H. LENNOX, B.A. (Toronton), M.Sc. (Alberta; Geophysicist.
P. MEYBOOM, Geol. drs. (R.U. Utrecht); Geologist.
E. G. LEBRETON, B.Sc. (Wales); Geologist.
W. ODYNSKY, M.Sc. (Alberta); Head, Soils Division.
J. D. LINDSAY, M.S.A. (British Columbia); Soil Surveyor.
S. W. REEDER, B.Sc. (McGill); Soil Surveyor.
A. L. MATHEIU, M.Sc. (Alberta); Soil Scientist.
A. WYNNYK, M.Sc. (Alberta); Soil Surveyor.
M. D. SCHEELAR, B.Sc. (Alberta); Soil Surveyor.
P. K. HERINGA, M.Sc. (Wageningen); Soil Surveyor.

Highway Research:

B. P. SHIELDS, B.Sc. (Manitoba), M.Sc. (Alberta); Head, Highway Research.
H. H. RIX, M.Sc. (Alberta); Engineer.

Industrial Engineering Services:

J. GREGORY, M.Sc. (Alberta); Head, Industrial Engineering Services.
H. A. SPENCER, B.Sc. (Saskatchewan); Engineer.
A. ANDERSON, B.Sc. (Saskatchewan); Engineer.
A. B. FITZPATRICK, B.Sc., M.A. (Alberta); Engineer.
M. LEE, B.Sc. (Alberta); Chemist.

The Provincial Laboratory of Public Health

This institution, which is established both at Edmonton and Calgary, is administered by the University and its senior staff members at Edmonton are members of University teaching departments and conduct certain University courses within the Laboratory building.

The staff includes:

R. D. STUART, M.B., Ch.B., M.D., D.Sc., D.P.H. (Aberdeen), F.R.F.P.S. (Glasgow); Provincial Bacteriologist and Director, Provincial Laboratory of Public Health.
D. SHUTE, M.B., Ch.B., M.D. (Manchester), D.T.M. (Liverpool); Director of Provincial Laboratory of Public Health (Calgary).
J. W. MACGREGOR, B.A., M.D. (Alberta); Provincial Pathologist.
J. H. STIRRAT, B.Sc., M.B., B.Ch., M.D. (Glasgow); Assistant Pathologist.
E. J. K. PENIKETT, L.R.C.P., M.R.C.S., M.B., B.S. (London); Senior Assistant Bacteriologist.
G. O. BAIN, B.Sc., M.D. (Alberta); Assistant Pathologist.
ERIKA P. CRICHTON, M.B., Ch.B. (Glasgrow); Chief Assistant and Bacteriologist, Provincial Laboratory of Public Health, Calgary.
SHEILA R. TOSHACH, B.Sc. (Alberta), M.A. (Toronto); Assistant Bacteriologist.
MARY E. WILLIAMS, M.B., Ch.B. (Liverpool); Assistant Bacteriologist.
J. W. CARMICHAEL, M.Sc. (Alberta), M.A., Ph.D. (Harvard); Mycologist.

Junior Colleges

By authority of the General Faculty Council of the University, junior colleges may be recommended to the Board of Governors for affiliation with the University under the following conditions:

1. **Staff—**
   (a) Number of Staff: A minimum staff of six teachers giving the major part of their time to junior college work must be maintained.
   (b) Qualifications of Staff: The members of the staff should hold at least the Master's degree or its equivalent in the main field of instruction. All staff members offering instruction at the university level must be approved for appointment by the Committee on Junior Colleges of the University of Alberta. (Under the School Act, all staff members offering instruction in High School work must hold teachers' certificates.)

2. **Curriculum—**
   Courses and programs of studies for university credit must be approved by the University Committee on Junior Colleges.

3. **Equipment—**
   Library and laboratory facilities must be adequate in the subjects taught in the junior college.

4. **Admission—**
   The conditions of admission to university courses and programs at junior colleges will be those which obtain in the University of Alberta.

5. Examinations—

The examinations of the junior colleges in courses offered for university credit will be the regular University examinations of the first year.

6. Financial Support—

The University of Alberta assumes no responsibility for the financial support of affiliated junior colleges.

7. Affiliation with Other Institutions—

Junior colleges affiliated with the University of Alberta may not have or enter into affiliations or accreditation arrangements with other colleges or universities without the permission of the General Faculty Council.

8. Period of Affiliation Agreement—

The period of any affiliation agreement shall be five years.

9. Public Announcements—

All documents which an affiliated institution proposes to issue for public information and which purport to contain a statement of the institution's relationship with the university or other universities shall be submitted before printing for the approval of the President of the University.

The teaching staffs of the Junior Colleges affiliated under these regulations are:

Mount Royal College, Calgary:

A. A. ARIANO, M.A. (McGill); Instructor in Latin and French.
W. J. COLLETT, B.A., B.D., B.Ed. (Alberta), M.A. (Columbia); Instructor in Psychology.
O. A. KELLY, M.A. (Alberta); Instructor in English.
R. W. McCREADY, B.Sc. (Alberta), M.Sc. (Illinois); Instructor in Chemistry.
E. L. PITT, M.A. (Alberta); Instructor in History.
M. S. FEADER, B.A. (Queen's), B.Com. (Ottawa), M.B.A. (Western Ontario); Instructor in Economics.

Lethbridge Junior College:

W. J. COUSINS, M.A. (Alberta);Dean, Instructor in History.
MARJORIE J. CLARK, B.Ed. (Alberta); Instructor in Physical Education.
L. BULLOCK, M.Sc. (B.Y.U.); Instructor in Botany and Zoology.
....., Instructor in Chemistry.
A. K. PUTLAND, M.A. (Alberta), B.Mus., B.Paed. (Toronto); Instructor in Education (Music).
F. A. RUDD, M.A., LL.B. (Alberta); Instructor in Economics.
M. T. SILLITO, M.Ed. (Alberta); Instructor in Mathematics, Physics.
F. D. CLANDFIELD, M.A. (Alberta); Instructor in English.
W. L. THOMPSON, B.A. (Toronto), M.A. (Stanford); Instructor in Psychology.
J. E. WHITELAW, B.Ed. (Alberta), M.Sc. (Southern California); Instructor in Physical Education.
ISABEL L. WILKINS, M.A. (Alberta), Ph.D. (Laval); Instructor in French.
B. L. MADIUK, B.Sc. (Alberta); Instructor in Chemistry.
G. A. ASMANN, B.Ed. (Alberta); Instructor in Sociology and Education.

Camrose Junior College:

K. G. MORGENROTH, B.A. (Queen's), M.A., M.Ed. (Saskatchewan), Ph.D. (Milton); Dean, Instructor in Psychology and Educational Psychology.
G. C. WHITE, B.A. (Concordia College, Minnesota), M.Sc. (North Dakota); Instructor in Chemistry.
GENEVA M. MAUSETH, B.A., (St. Olaf), M.A. (Minnesota); Instructor in English.

D. B. PODOLL, B.A. (Concordia College, Minnesota), M.A. (South Dakota); Instructor in History.
J. R. NEFF, B.Mus. (Concordia College, Minnesota), M.Mus. (Denver); Instructor in Music.
J. R. DALAGER, B.Sc. (Concordia College, Minnesota), M.Sc. (South Dakota); Instructor in Physics.
K. D. McFADDEN, B.A. (Concordia College, Minnesota); Instructor in Zoology.

DEPARTMENT OF EXTENSION

The purpose of the Department of Extension is to bring the facilities of the University within the reach of every citizen of the Province. To this end it cooperates with individuals and organizations in projects which advance the social, economic and cultural standards of the community.

Staff:

D. D. CAMPBELL, B.Com., B.A. (British Columbia); Professor and Director of Extension.
G. T. POTTER, M.A. (Oxon.); Assistant Professor.
E. W. CORMACK, C.G., O.B.E., B.Sc. (Alberta); Assistant Professor.
A. DES CHAMPS, B.Sc. (Manitoba); Agricultural Secretary, Assistant Professor.
D. A. BANCROFT, B.Sc. (Alberta); Lecturer in Public Administration.
Z. KAY, B.A. (Manitoba), Dip. International Law (Manchester), M.A. (Econ.) (Manchester); Lecturer in Public Administration.
MARY I. DODDS, B.Com. (Alberta), M.S. (Columbia); Extension Librarian.
L. FOWLIE, B.A. (Queen's); Assistant Extension Librarian.
....., Supervisor of Visual Instruction, Assistant Professor.
ESTHER NELSON, Extension Assistant Professor of Drama.
H. WOHLFARTH, Extension Assistant Professor of Art.
G. K. GREENE, B.A. (Alberta); Extension Assistant Professor of Music.

Short Courses, Classes and Conferences

An important aspect of the work of the Department is the number and variety of short courses and conferences held at widely separated points across the province. These are usually arranged in cooperation with a sponsoring organization or group, and vary in duration from two to forty days and enrol upwards of 8,000 students in total. Many are annual events and one, the Annual Farm Young People's Week, is in its fourth decade.

The material covered ranges from gas metering for oil workers, hospital administration to creative writing and life drawing. Instructional staff is drawn from the University itself and from the university community across the continent.

The Department's program of non-credit evening classes includes a variety of subjects in its fall and winter terms. Over 8,000 are enrolled in courses of Comparative Religion, Moral Philosophy, Landscape Design, Geology and Music and many others currently held in Edmonton, Calgary and other points throughout the province.

Study Group Courses and Information

A routine but nevertheless important part of the work of the Department is that of providing information and advice on innumerable questions which come from across the province. Supplementary lectures by individual members of the University staff and study group courses are available on request.

Through the office of the Agricultural Secretary, bulletins and other

publications in agriculture are distributed across the province. Recent major additions include the 'Swine Record Book', 'Soil Survey of the Rocky Mountain House Sheet' and 'Agricultural Publications of the University of Alberta'. A leadership training program in cooperation with the farm organizations is an important part of the program. Information on agricultural publications, etc., is available from the Agricultural Secretary.

Public Administration Training Division

The Public Administration Training Division acts as a focal point for data and information in this field and provides training in Municipal Administration, Municipal Assessment and related fields. Currently two major certificate programs are offered and other training programs are contemplated for the future.

Fine Arts

In the belief that the most effective adult education lies in stimulating latent creative energies, much time has been given to the encouragement of the arts in Alberta. Unique in Canada are the thirty community art classes scattered throughout the province and served by competent instructors drawn from the University and elsewhere. Extension lecturers in drama, music and art devote full time to cooperating with local organizations and individuals in raising the cultural standards of the community.

Extension Library

The Extension Library provides an important and valuable service to the smaller outlying communities of the province and the frontier settlements of the North West Territories. The Library Catalogue lists 46,659 volumes, all of which are available on request. Some six hundred and seventy travelling libraries are made available at strategic points in the area served and total circulation through these and from Open Shelf approaches 115,000.

In addition to this service and the considerable amount of reference research requested by readers, the Library assists in improving professional standards through short courses and through close cooperation with other library units.

Visual Instruction Division

The Visual Instruction Division, which pioneered in education over thirty-five years ago with the "magic lantern" and slides, now maintains a 16 mm. film library of over 3,400 subjects, about 2,000 film strips and 200 sets of slides. While the bulk of this material is the Division's central library, a good many films are made available to rural communities through the medium of their Film Councils. Last year, audiences aggregating three-quarters of a million people attended ten thousand showings of film slides and film strips.

The Visual Instruction Division works with other agencies and with Alberta communities in promoting effective visual instruction, through Film Work Shops and Visual Education Institutes.

Petroleum Industry Training Service

The Petroleum Industry Training Service, sponsored by the Canadian Petroleum Association, the Canadian Association of Oil Well Drilling Contractors and the Petroleum and Natural Gas Conservation Board, operates as an integral

part of the Extension Department. The object of the service is to promote more efficient working methods, to provide training for oil field personnel and to emphasize the importance of safe working procedures.

To this end a number of technical courses, governing such subjects as: Drilling Fluids, Care and Operation of Mud Pumps; Care and Use of Wire Lines; Drilling Bits; Field Handling of Natural Gas; Oil and Gas Production; Gas Metering, etc. are held at points in the province convenient to the indutry. An Accident Prevention Service consisting of Safety Meetings and Job Instruction Training at the drilling rigs is offered to companies wishing to organize their own safety programs.

BANFF SCHOOL OF FINE ARTS

The University's Banff School of Fine Arts enjoys an international reputation and draws students as well as staff from all over the world. Classes are conducted under the direction of internationally famous artists in an atmosphere that is at once challenging and encouraging.

Staff:

THE HONOURABLE SENATOR DONALD CAMERON, M.Sc. (Alberta), LL.D. (British Columbia); Director.

J. C. K. MADSEN, B.Com. (Alberta); Assistant Director.

N. G. SHAW, B.Sc. (New Brunswick); Secretary.

The Summer Session

Summer Session registration is limited to 600 students. Courses offered are of two kinds: non-credit courses which are open to those who may be taking the subjects either professionally or for their own recreation and pleasure, and University and teacher's credit courses which can be applied towards a university degree.

Extension

The Banff School is rapidly developing into an important centre of University extension work with an increasing number of short courses, educational meetings and conferences being held there. During the past year, some fifty organizations held short course schools and conferences of from three or four days' to six weeks' duration. In particular, the location and facilities of the School provide an ideal setting for a comprehensive program in community leadership and for advanced training in business administration.

Business Administration.

The Banff School of Business Administration, under the point sponsorship of the Universities of Alberta, British Columbia, Manitoba and Saskatchewan, with head offices at Banff, is meeting industry's demand for executive training through its Advanced Management courses.

Organizations wishing to hold conferences or meetings at the School should make arrangements with the Director well in advance.

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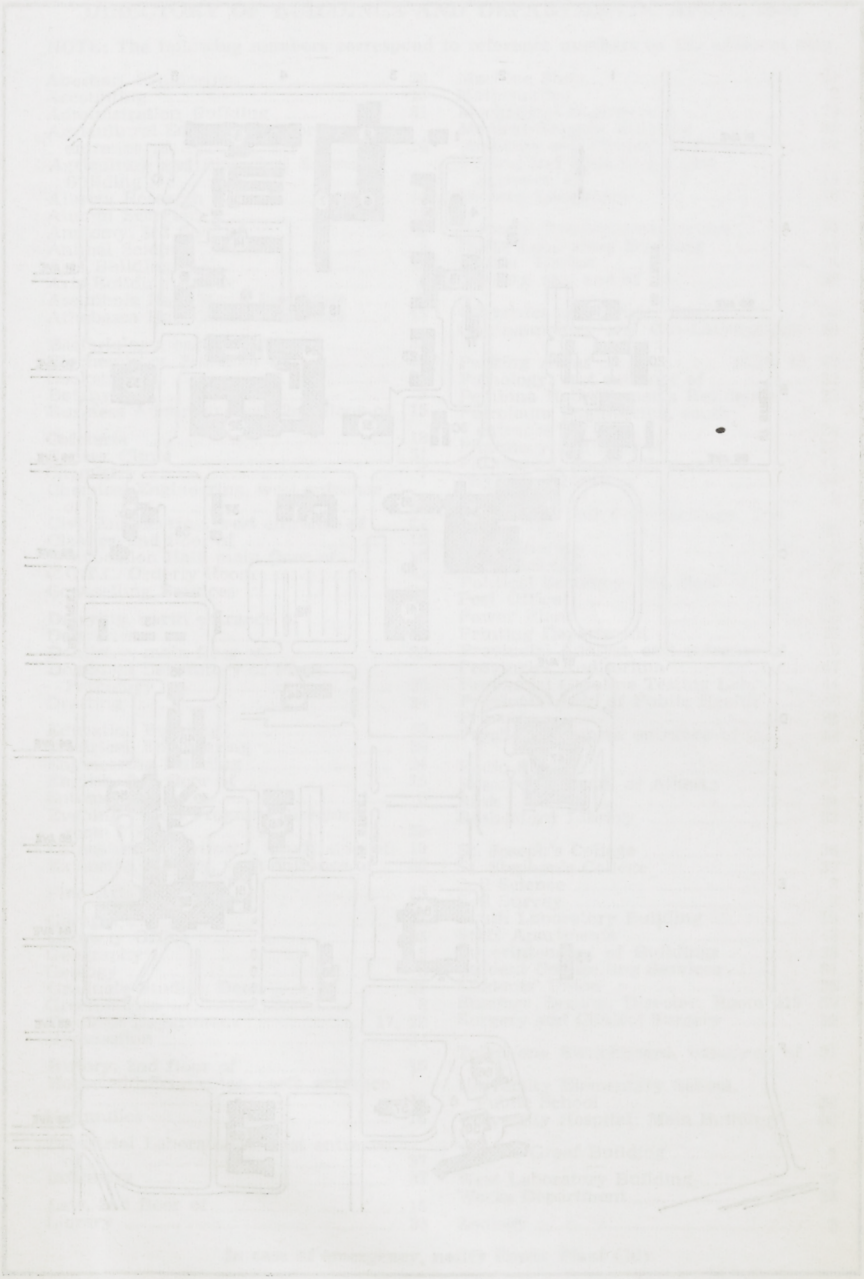
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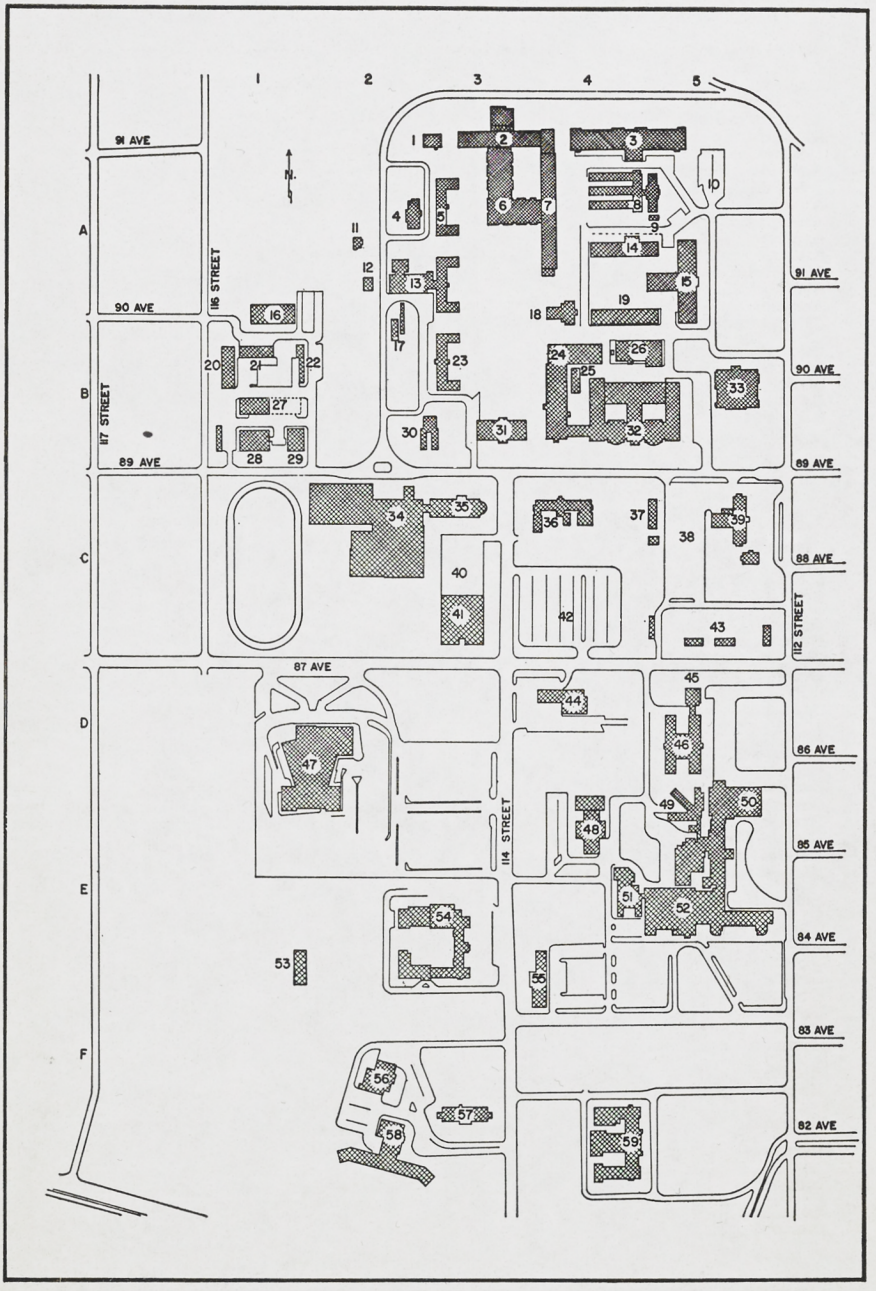
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MAP OF EDMONTON CAMPUS



UNIVERSITY OF ALBERTA

DIRECTORY OF BUILDINGS AND DEPARTMENTS, APRIL, 1960

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In case of emergency, notify Power Plant (26).

For other information, apply to the office of the Bursar, Administration Building.

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